RAILROAD GAZETTE

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Contributions.

A Plan for Through Billing and Settlements.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is generally conceded that through billing of freight followed by settlements through the accounting departments of the respective roads is desirable, yet no effective effort has been made to inaugurate such a system. Large sums of money are expended in stationery and salaries of clerks at rebilling stations for duplicating way bills and abstracts, and at junction points in making reports, and for auditing and settling balances weekly between connecting lines, which in turn are verified and audited again at the general offices of the roads in interest. Treasurers of debtor roads have also to perform some labor and are caused annoyance by the agents at such points drawing for cash to settle with. Besides, there is some risk in having large sums of money in the hands of these agents, as will happen from time to time.

Inasmuch as freight charges are almost universally collected at destination, the chief objection to a settlement monthly through the general offices would be on account of the necessary delay in making payment to the creditor roads. Under the system of settlements at junction or rebilling terminal points, the cash is paid promptly to the road delivering the freight, while under the other plan the creditor road would be out of use of a portion of its money for a month, and of another portion for two months or more. To illustrate: assuming that the terminal road draws the line for the monthly settlements on the freight received until midnight of the last day of the month, any freight billed within short distances during the latter portion of the month would be included and settled for about a month after; but such as came from long distances would have to be included in the following month, and the charges settled for over two months after the date of the billing. Take a shipment from San Francisco destined for New York, with charges paid to vessel by the originating road, say Oct. 15. It arrives at destination in the first week in November and is included in the accounts for that month, which are audited in December, and settled about Jan. 1, so that the originating road, as well as those between it and destination, would not be paid until some two months and a half after the date of the billing; and the initial road would in addition have to lie out of its cash advanced. For shorter distances the results would be in proportion, but still great.

If this objection can be overcome, I think that roads would agree to bill as proposed, and to settlements through the accounting departments similar to those made for through tickets, or to a general clearing house.

Each of the following have occurred to me as being sufficient to satisfy the creditor roads, viz.:

1. An amount equal to the average amount in the hands of a debtor road to be deposited by it with a creditor road.
2. Instead of this deposit the debtor road might pay interest on such average amount.
3. The creditor road could be permitted to draw on account on the debtor road at certain specified periods for the average amount due.

In case a clearing house is established it could make similar settlements and account with creditor roads.

The bill used by the initial road should show the following:

1. Name of initial road. 2. Shipping station. 3. Station billed to. 4. Route. 5. Date and number of waybill. 6. Car initials and car number. 7. Description of car (kind, length and capacity). 8. Weight (gross, tare and net). 9. Blank for recording transfers (station, date, initials and number of car transferred to. 10. Consignor and point at which freight originated. 11. Consignee and destination. 12. Description of articles and marks. 13. Weight. 14. Rate and rate references. 15. Freight charges to be collected. 16. Advances paid. 17. Amount prepaid.

To this bill should be attached perforated coupons equal in number to the roads on the route billed over. These coupons, except the last, should have upon them: Name of initial road and station, date, waybill number, car initial and number, blank for car number, and initial to provide for transfer, and room for "Received" stamp of junction agent. The junction agent of the first connecting line should stamp the first coupon, showing that the car involved had been received, tear it off and hand it to the junction agent of the initial road, who should forward it to the accounting department of his line, and thus show that the service has been performed over the road he represents. Similar action should be taken by the agents of the succeeding roads in turn. The last or terminal coupon should be the same as the others, except that the blank for transferring can be omitted, and should be stamped by the terminal agent to show date of arrival, and then forwarded to the initial road. This agent should also send duplicates of this last coupon to the other roads and fast freight lines interested, to the end that all may know that the service has been completed and what is to be included in the month's account. Tissue copies of the billing must be sent by the initial road to the other roads and fast freight lines, but in making up monthly accounts no bills should be included that are not sustained by the coupons, such bills being left over for future adjustment. No divisions should be statied on the waybills, that work being done in the respective accounting departments in gross, with but little labor comparatively. For example: after the bills are assorted it is found that there are 1,000 cars of wheat transported between the same stations; the percentages of division are the same; the total charges being ascertained, one calculation covers the whole, while if the figuring was done on each bill, the calculations would be very numerous.

By the plan proposed, the billing and the service performed would go hand in hand, and each road involved would have the proof of service on its files. Accounts could be rendered promptly for all bills that are sustained by coupons, and such as are not can be treated separately without delay to the general accounting. The coupons mentioned, taken in connection with tissue waybills previously received by passenger trains, would enable the accounting departments to make prompt statements daily of the estimated revenue, and, so far as through or foreign business is concerned, with accuracy; and also to promptly report the movement of through traffic and cars to the managers.

This is written more, however, for the purpose of calling attention to the importance of the subject, than to present or insist on any specific method, the latter being stated so that a basis may be had for discussion, amendment and perfection. It is clear to my mind that if the numerous freight associations, in connection with the Association of American Railway Accounting Officers, were to take up this subject with an earnestness of purpose, a feasible plan could be developed and adopted with the sequence of a great saving in expenses, and a more prompt transportation of freight. S. Y. MCNAIR.

Lining up an Engine.

CORNWALL, Ont., Dec. 17, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Which is the best way for lining up an engine? I know one way, viz.: fastening one end of the line to the crank and the other to the centre of the head of the cylinder; but this way is said by some engineers to be improper. A. R.

[Our correspondent asks a question on a point that is somewhat disputed. However, we believe that the majority of locomotive builders and railroad men will agree that the following is a satisfactory way of "lining up" a locomotive:

First.—Fill the boiler of the locomotive with water, and drop the engine into the running position on the trucks and driving wheels. This is necessary in order to bring the proper strain upon all parts, because otherwise if the engine be lined up when blocked up she will not be in line when resting on the springs, owing to the deflection of the parts, particularly of the frame.

Second.—Draw a line from the centre of each cylinder at the front end to points at the back end of the locomotive, which are at the same distance apart and at the same distance from the centre of the locomotive as the centres of the front faces of the cylinders. Make the location of this line coincident with the centre line of the cylinder vertically by actual measurement in the cylinder at both ends. Both ends of these lines are now horizontally at the same distance from the centre of the locomotive, the front end of each line corresponding exactly with the centre of the cylinder through which it is drawn.

Third.—At the back end of the cylinder measure the distance of the line from each side of the cylinder horizontally. These measurements should be exactly alike, or the cylinders are out of line, horizontally.

Fourth.—Adjust the guides in vertical height and alignment, according to the centre line, as above drawn.

Fifth.—From the drawings of the locomotive determine where the centre lines should cross the main pins. Measure to see if the alignment of the actual engine corresponds thereto.

Sixth.—Draw a line exactly at right angles to both centre lines through the cylinders just back of the back cylinder head. This line should be found to be at the same distance from the grinding faces of the two cylinders; if not, one cylinder is ahead of the other.

Seventh.—Measure the distance of the centres of the driving axles from this tranverse line. These distances should correspond; if not, one driving box is ahead of the other. If the cylinders are found to be out of line horizontally, that is, the centre lines as drawn above are found not to correspond with the centres of the cylinders, and it is decided not to change the cylinders to bring them into alignment, then the guides should be adjusted, not to the centre line as drawn above, but to the actual centre lines of the cylinders.

When the crosshead is in position it is a good plan to place an arbor in the crosshead and a bushing in the stuffing-box, and to move the crosshead to and fro to determine if the centre of the arbor varies from the centre of the cylinder during this movement. If it does, then the guides have not been properly located; that is, provided the arbor and bushing be accurately fitted.

It is also of the utmost importance, when the main rod is put on, that the crosshead end be keyed up tightly and the engine placed with the cranks first on one centre and then on the other, the crosshead being moved to the corresponding ends of the guides, in order to observe if, in these positions, the stub end of the main rod be in its proper position when raised up to the crank pin. If there is considerable movement laterally to the main rod at the stub end and it is difficult to tell when it is in the normal lateral position, let the stub end be moved laterally until the slack is taken up in each direction. Then divide this distance exactly, and the centre will be approximately the normal position of the rod, according to the actual fitting and construction of the parts.

By actual trial we know in many cases that a locomotive lined up before the wheels are put under will not by any means necessarily be in line when she is ready for service. There are many ways of lining up an engine, and there are many intermediate steps which have been omitted in the preceding; but the plan indicated is an acceptable one so far as it goes.—EDITOR RAILROAD GAZETTE.]

Recent French Compound Locomotives.

The illustrations herewith show the general designs of recent compound locomotives built in France. Figs. 1 to 3 inclusive are those built by the Paris, Lyons & Mediterranean Railroad, and figs. 4 to 6 inclusive are those used on the Northern Railroad of France. The general dimensions of these locomotives are given in the table. The results of actual service have not as yet been made public, but general conclusions have been drawn by the engineers in chief of the two lines.

The Paris, Lyons & Mediterranean compound locomotives were put in service in the early part of this year. They are of three types: Fig. 1, designed for high speed express trains; fig. 2, for level lines with heavy traffic or for passenger and mixed trains on lines having grades not greater than two per cent., and fig. 3, a type for passenger and freight on lines having heavy grades. These three types possess the following common characteristics:

First, a boiler pressure of fifteen pounds per square inch carried in boilers made of steel, which is a departure from the customary boiler construction, of iron, on the P., L. & M.

Second, the use of four cylinders, two high-pressure between the frames, and two low-pressure outside the frames.

Third, the high-pressure pistons drive one axle, while the low-pressure cylinders drive another axle, all wheels being, however, coupled together with parallel rods.

Fourth, the distribution of the steam by the Walschaert valve gear.

Fifth, the regulation of the speed and power of the cylinders by a novel device consisting of steam reversing gears, and peculiar shaped cams which establish a varying ratio between the cut-offs in the high and low pressure cylinders independent of the action of the engineer.

Sixth, the admission of steam directly into the intermediate reservoir between the large and small cylinders only at starting.

The locomotives were designed by M. Ch. Baudry, Assistant to the Engineer in chief of Material and Traction, M. Henry, and under his direction. They are the result of long continued study by these gentlemen into the peculiarities of compound locomotives. With reference to the boiler pressure, these engineers state that if a maximum economy is desired in locomotives, it is necessary to increase the boiler pressure in a large proportion and to adopt the compound system, and that it is true that the compound system of itself will result

in a certain economy without augmentation of the boiler pressure, but that the final advantage of compounding only, considering the additional parts—on French locomotives—may be somewhat disputed. With high pressures, on the contrary, the economy is so marked that the advantage of compounding, even with the large number of parts, as shown on the designs herewith, is considerable. In view of the foregoing, the Paris, Lyons & Mediterranean Railroad has adopted a standard pressure of fifteen pounds per square inch. The long and exhaustive series of tests to determine the most advantageous length of tubes on these locomotives has been referred to before in the *Railroad Gazette*, Nov. 15, 1889.

The domes of these locomotives contain water separators, intended to extract all entrained water from the steam before it passes to the cylinders. This is accomplished by allowing the steam to pass up into the dome through a large pipe which passes through a diaphragm plate, extends to the top of the dome, where it turns over, the exit end pointing downward. A pipe of similar shape leads from the steam space over the Belpaire fire box into the dome. The construction of the dome itself is peculiar. It is formed of a base plate of steel of considerable thickness, pressed into shape to fit the boiler and to receive the barrel of the dome. The dome itself, therefore, is not flanged, being merely a barrel rolled up and riveted together. This is a cheaper construction than that used on American locomotives. The smoke stack has a straight barrel, with a tapered cone on the inside extending down nearly to the exhaust nozzles, which are variable and operated from the cab. The formation of the interior of the stack is essentially the same as the ordinary steam ejector. Good results are reported from it in service.

The admission of steam to the receivers at starting is accomplished by opening a small valve, through which the steam is wire drawn to the desired pressure. The intermediate reservoirs have a volume varying from 3½ to 5½ times the volume of the small cylinders. The advantages claimed for these designs are: more uniform turning effect on the drivers, a less obliquity of connecting rods to act upon the track, and a more uniform counterbalance.

Each of these types corresponds to an old type of non-compound, the principal difference being the increase in the boiler pressure and the arrangements of the cylinders. The object of this correspondence has been to allow the transformation of the old engines to compound engines by an increase in boiler pressure and a change to compound cylinders.

In calculating the cylinders for these locomotives, the engineers used the diagram herewith in the following manner: They first determined how much steam the boilers could develop under given conditions, and then assumed that the high-pressure cylinder must be able to use all of this steam. A table was prepared showing the amount of steam used at different speeds, and from it was determined the cut-offs and diameter of cylinder necessary to use that steam with good economy, endeavoring, meantime, to bring the range of expansion for average working as nearly as possible to the point marked B on the diagram, in order that the fall of pressure between the high-pressure cylinder at exhaust and the receiver might not be excessive. It is reasonable to suppose that the different conditions require different ratios of cylinder capacity, and this it will be seen was the conclusion of the French engineers when considering the proportions of these types of locomotives.

Fig. 4 shows a locomotive built on a compound system from the Northern Railroad of France. It can be used either as an ordinary single-acting locomotive or as a compound. It was put into service in August, 1887. This locomotive was exhibited at the Paris Exposition, where it attracted considerable attention. It has three cylinders, one high-pressure between the frames and two low-pressure outside of the frames, all connected to the second pair of driving wheels, the driving wheels being themselves coupled together with parallel rods. The general plan of the locomotive is like that of the American mogul. The location of the cranks is such that the two outside low-pressure cylinder cranks are at 90 degrees with each other, and the crank of the centre cylinder bisects the exterior angle formed by the cranks of the outside cylinders. The intermediate reservoir is formed by chambers which exist in the interior body of the cylinder casting. In the fire-box is a brick arch. We have not sufficient space to give a detail description of this locomotive, and drawings showing the whole and completed engine have not as yet been issued. However, the valve gear is so peculiar as to be worthy of attention. The valves for the low-pressure cylinders are Allen double-ported valves, while that for the high-pressure cylinder has an independent cut-off similar to the Meyer system, but the outside lap and the grade of admission of steam is regulated by the lateral deplacement of the valve, its sides, as well as the direction of the ports, lying at an angle with the axis of the cylinder.

The locomotive, fig. 5, is of the Woolf type used on the Northern Railroad of France, and previously illustrated and fully described in the *Railroad Gazette*, page 156, March 8, 1889.

Fig. 6 shows a compound locomotive with four cylinders, constructed for the Northern Railroad of France by the Alsatian Society in 1886. It was exhibited at the Paris Exhibition last summer, and was admirably finished.

The design of this locomotive is the result of the studies of M. Alfred G. Glehuy, Engineer and Manager of the Alsatian Society of Mechanical Construction. Some of the principal dimensions of this locomotive appear in the table. This locomotive has the peculiarity of being constructed with four cylinders, two of which are of high-pressure and two low-pressure, the two high-pressure being placed inside and connected to the front pair of wheels, and the two low-pressure on the outside and connected to the back wheels, the wheels themselves not being connected with parallel rods. The valves are below the low-pressure cylinders, and on the side of the high-pressure cylinders they are driven by the Walschaert system of valve gear.

The distributions of the steam in the high and low pressure cylinders are independent of each other and arranged in a manner similar to that employed by M. A. Mallet on the locomotives for the Bayonne à Biaritz Railroad. To facilitate starting the engineer may introduce steam from the boiler directly into the intermediate reservoir by a pipe about 20 millimetres interior diameter. Generally, however, these engines start without so admitting steam.

The admission pipes to the high-pressure cylinders are located in the smoke box, and the exhaust pipes, which constitute a portion of the intermediate reservoir, have a total volume that is equal to 1½ times that of the two high-pressure cylinders combined, and a safety valve on the intermediate reservoir limits the pressure to one-half of the boiler pressure, which is indicated to the engineer by a steam gauge placed on the back of the boiler and put in connection with the steam chest of the right hand low-pressure cylinder.

Rather extended experiments have been made with this locomotive to determine its tractive power and compara-

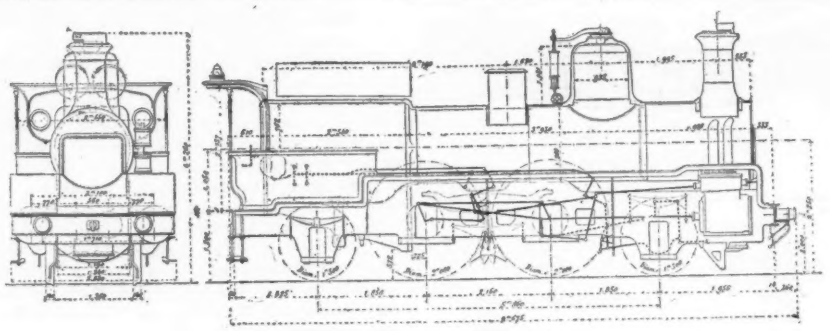


Fig. 1.

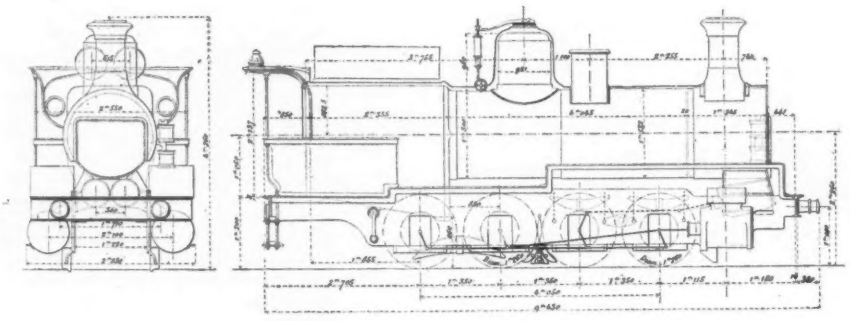


Fig. 2.

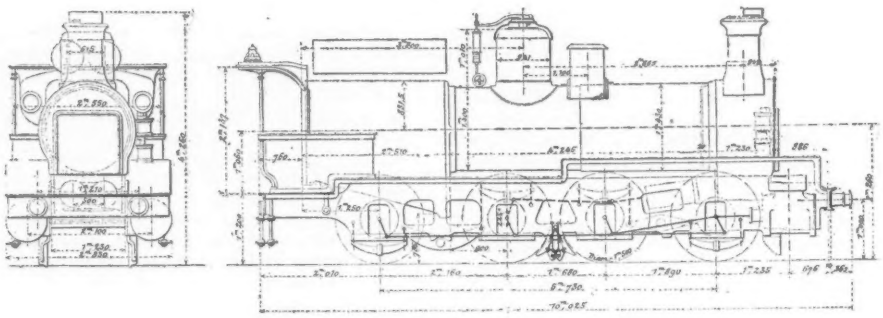


Fig. 3.

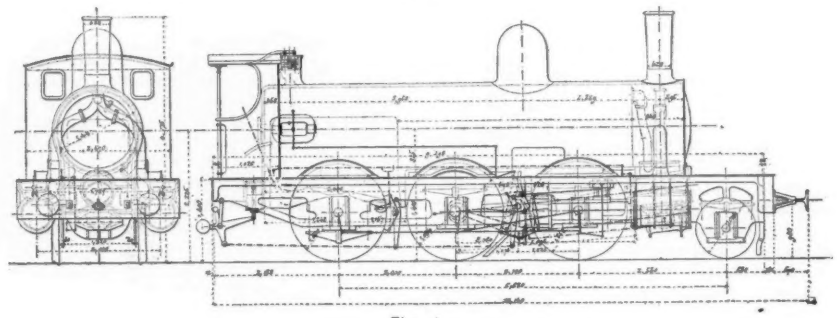


Fig. 4.

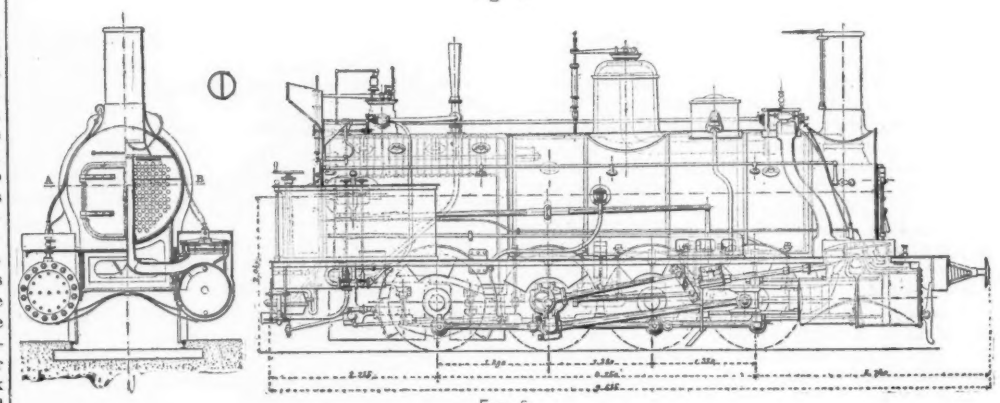


Fig. 5.

RECENT FRENCH COMPOUND LOCOMOTIVES.

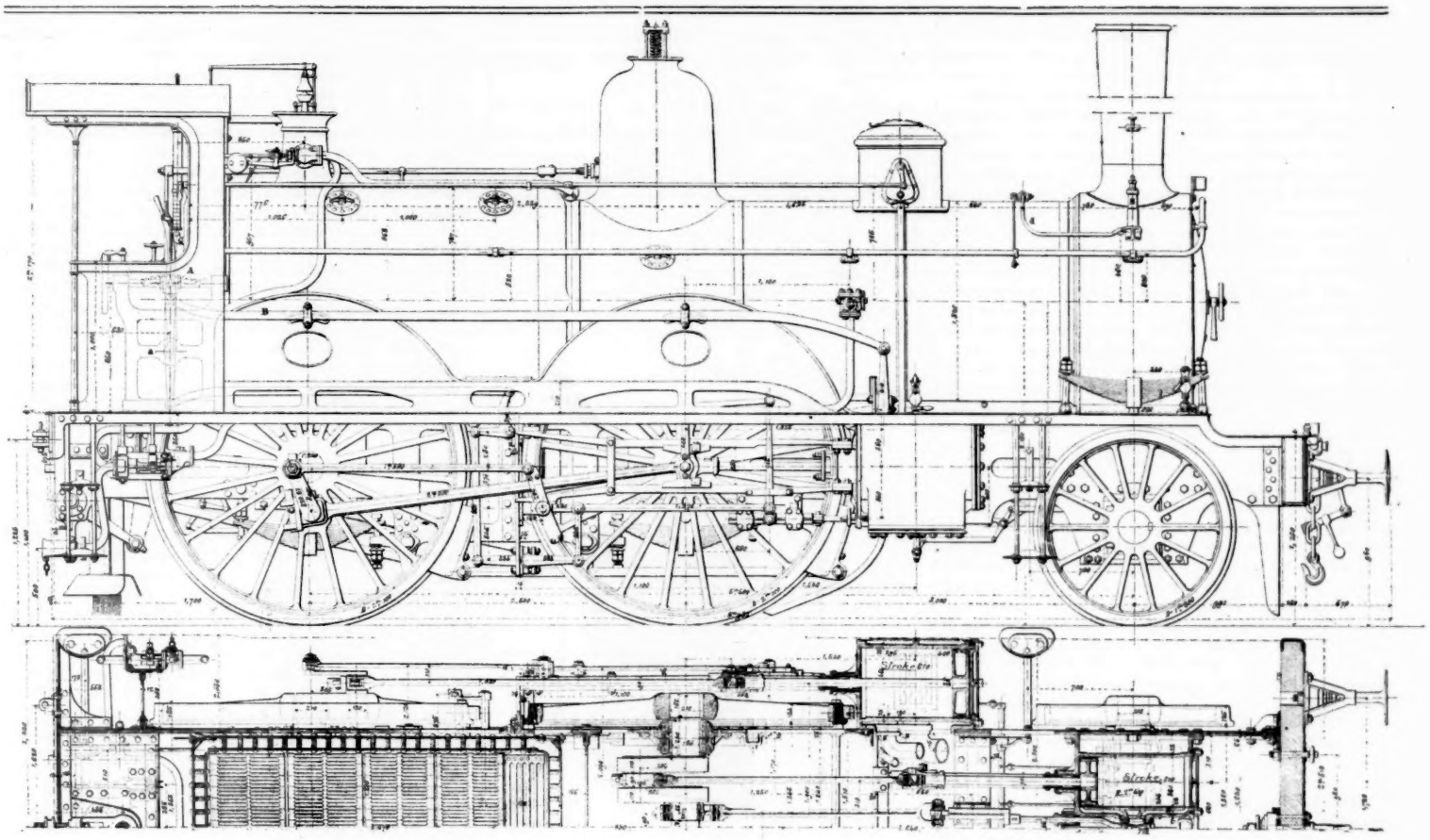
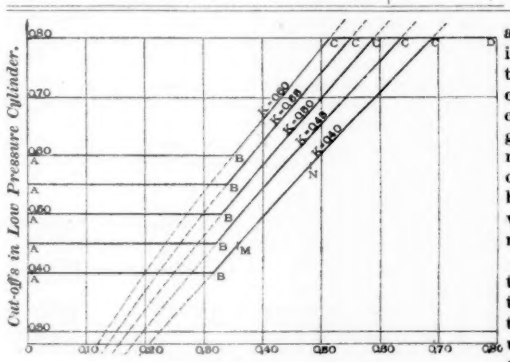


Fig. 6.
RECENT FRENCH COMPOUND LOCOMOTIVES.

DIMENSIONS OF RECENT FRENCH COMPOUND LOCOMOTIVES.

	Figure No.					
	1.	2.	3.	4.	5.	6.
Number of cylinders	4	4	4	3	4	4
Number of coupled wheels	4	8	8	6	8	4
Diameter of driving wheels—inches	78.7	59.0	49.5	64.95	51.2	82.68
Diameter of boiler—inches	49.7	55.1	59.0	53.0	60	52.2
Total weight of locomotive—pounds	117,947	125,444	125,883	93,301	113,987	74,404
Weight available for adhesion—pounds	65,256	125,444	125,883	79,918	113,987	54,328
Diameter of low pressure cylinders—inches	19.7	21.3	21.3	19.7	25.7	18.1
Diameter of high pressure cylinders—inches	12.2	13.4	14.2	17	14.8	13
Stroke of cylinders—inches	24.4	25 6	25.6	H. P. 19.7 L. P. 27.56	26.6	24
Ratio of volume of high pressure cylinder to volume of low pressure cylinder	1 to 2.6	1 to 2.53	1 to 2.26	1 to 3.62	1 to 3	1 to 1.96
Angle of advance of the cranks connected to the high pressure cylinders ahead of those connected to the low pressure cylinders	198°	232° 48′	235° 54′	135°	90°	
Type of valve gear	Walschaert	Walschaert	Walschaert	Walschaert	Stephenson outside.	Link
Type of valve	Allen	Allen	Allen	Allen	Allen	Plain D
Travel of valve, high pressure—inches	4.56	5 40	5.55	3.15 and 4.33	6.26	
Travel of valve, low pressure—inches	5.59	5.63	5.63		6.26	
Outside lap, high pressure, front—inches	1.11	1.11	1.14	Variable	1.24	
Outside lap, high pressure, back—inches	1.03	1.11	1.14	Variable	1.22	
Outside lap, low pressure front—inches	1.07	1.14	1.14	1.06	1.24	
Outside lap, low pressure back—inches	.95	1.14	1.14	1.06	1.22	
Inside lap, low pressure—inches	0	.04	.04	.04	.0	
Inside lap, high pressure—inches	0	.04	.04	Variable	.32	
Length of high pressure steam ports—inches	7.9	9.05	9.05		17.73	
Length of low pressure steam ports—inches	12.2	14.17	14.17	12.	17.73	
Area of steam ports, high pressure—sq. inches	10.9	14.0	14.0		24.47	
Area of steam ports, low pressure—sq. inches	21.7	25.0	25.0	21.24	34.93	
Area of exhaust ports, high pressure—sq. inches	18.6	21.4	21.4		24.47	
Area of exhaust ports, low pressure—sq. inches	38.4	44 6	44.6	33.12	63.94	
Average maximum cut off high pressure—per cent	71.5	76.6	77.6	64.		
Average maximum cut off low pressure—per cent	84.5	77.9	79.3	87.5		
Volume of intermediate reservoir—cubic feet	9.25	8 23	8.23		.0	
Total heating surface—sq. ft	1,377	17.53	1,690	1,226	1,356	1,109
Steam pressure—lbs. per sq. in.	213	213	213	199	142	156.4
Area of grate—sq. ft	25.19	25.51	23.47	22.5	22.4	24.43



Cut-offs in High Pressure Cylinder.

Diagram giving for Various Ratios of K the Relation between the Degrees of Admission in the High and Low Pressure Cylinders of a Compound Locomotive.

tive work done in the two cylinders. The results of these experiments are about as follows: The excessive compression in the small cylinders shown when the locomotive was first put in service has been somewhat diminished by decreasing the inside lap of the valves and increasing the volume of the clearance spaces, which is accomplished by giving greater room at the ends of the cylinders between the pistons and the heads. The cylinder condensation and the re-evaporation in the cylinders has been calculated from the indicator diagrams. The loss of condensation between the commencement of expansion in the small cylinder and the end of compression in the large cylinder has been found to be about 10 per cent. of the weight of the vapor contained in the small cylinder at the end of admission.

It has been found necessary in this locomotive to make independent the distribution of steam in the two cylinders, and it has been found further that the traction is inferior to that of the ordinary locomotive in use on the Northern Railroad of France in the same service. Probably by reason of the independence of the driving wheel, and to remove this, the sanding device of Gresham & Craven has been added to the engine. The pressure of the steam escaping from the low-pressure cylinders has been found to be very large when the engine was performing heavy work; and it is of advantage, therefore, to employ larger expansion cylinders to reduce that pressure, and to procure at the same time a better utilization of steam by a prolonged expansion. The fuel used with this locomotive was slightly less than that of the ordinary machine in about the same service, and in order to increase the economy a brick arch was put into the fire box. Thereafter, the fuel consumed was somewhat less than with the ordinary machines.

The Use of Dynamite at Johnstown.

At the November meeting of the Engineers' Society of Western Pennsylvania, Mr. Arthur Kirk read a paper on the use of dynamite in breaking up the jam at Johnstown. He described the character and dimensions of the dam formed above the bridge by the flood. This he measured to be 350 ft. wide and 800 ft. long up the stream, with an average depth apparently of 20 ft., although many places must have been 40 ft. deep. This obstruction was composed of all conceivable material, bound together with hundreds of miles of telegraph wire, telephone wire and heavy copper wire for electrical purposes. The roots of the trees, also, aided greatly in holding the mass together. Mr. Kirk concluded from his observations that the length of the roots of a tree are nearly equal to its height while growing, and that the tensile strength was nearly as great as that of iron rods of the same diameter.

To remove this mass as quickly as possible was a unique and exceedingly difficult problem. As our readers know, great objections were made at first to the use of dynamite, and several plans were tried and failed. Mr. Kirk began blasting close to the stone piers of the railroad bridge, using charges of 5 lbs. each. As he could he increased the charges to 10 lbs., firing three to six shots simultaneously, using an electric apparatus for exploding. As the opportunity for using heavier charges increased he made torpedoes of 24 cartridges tied to boards, with two electric exploders, one in each end of the charge; "then by pushing the charge or torpedo down between the logs I could sometimes get it 6 to 10 ft. under water; then by placing a line of six to eight of these within co-operating distance, say 10 to 20 ft. apart, and firing all simultaneously by means of a battery, each torpedo, if placed close to a large, strong log, would cut it off in sections, and it, with its superincumbent weight, would be hurled often 50 ft., the lighter articles often 100 ft., in the air, and a column of water often 20 by 100 ft. would be thrown 100 ft. in the air and fall back in heavy rain; this had the effect of shaking all loose. Of course the heavy articles returned earthward first and sank; the lighter articles would float off down stream.

"Again, I had water-tight gum tubing 2-in. diameter; when I wanted to cut off the end of a railroad car bed I would make a long sausage-like torpedo by putting, say, 20 dynamite cartridges in, one after another, putting an electric exploder in the last cartridge at each end, tie both ends like a long stretch of Bolougna sausage, then lay this along where it was desired to make a cut and cover it with mud, and when fired it would cut through the oak timbers and irons of a railroad car, the same as if they had been so much pasteboard.

"One day I found a large mass to be shaken up, with fine chance for a blast, away down some 10 ft., but the

only chance to get a torpedo down to the right place was between two large logs fast in the drift, and not quite 3 in. apart. While planning what to do, I happened to disturb some white rags at my feet; picking it up I found it to be a fine, strong pillow-slip; dropping the closed end down between the logs, I made a man hold the pillow-slip open until I dropped 80 dynamite cartridges down lengthways between the logs into the pillow-slip, then two exploders, and tied the mouth of the pillow-slip together, attached a rope and lowered the torpedo away down, guiding it to the desired place, and fired it with very satisfactory results."

One of Mr. Kirk's operations was the destruction of the walls and steeple of a brick church. This was a building about 70 × 100 ft., the walls of which were still standing, as well as the brick work of the steeple to a height of about 125 ft. It was decided to blast it down. Twenty-five holes were drilled into the brick walls and the charges fired simultaneously. A belt about 1 ft. wide and 2 ft. from the ground was pulverized and blown out, and the whole building, with the pinnacles of the steeple, melted down into a mass of bricks, very few of which were broken by the fall.

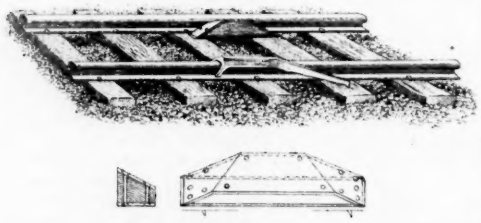
As time passed, and the people living along the course of the rivers below became more anxious about the contamination of their water supply, those in charge of the operations became more urgent for haste in getting through the drift. After a canal about 100 ft. wide had been carried up through the centre of the drift some 600 ft. from the stone bridge, it was decided to use a big blast. Nine boxes were prepared, each containing 50 lbs. of dynamite, with two exploders in each box. These were placed from 25 to 35 ft. apart, three across the breast of the drift at the head of the canal, three more about 35 ft. back, and three more 30 ft. further back. These were sunk from 4 to 6 ft. under water and fired simultaneously. Large logs and railroad ties were thrown 100 ft. in the air; lighter articles were carried with the column of water at least 200 ft. high. The drift was loosened by the acre, and Gov. Foraker, of Ohio, was notified that the drift was open through. It took several weeks after this to clear up the shores, as the water fell rapidly, which added to the trouble and expense of removing the drift wood.

In conclusion, Mr. Kirk said that without the use of dynamite the greater part of the Johnstown drift would still be there untouched, and he has every reason to believe very much still remains under water, covered with sand and gravel. The discussion of this paper largely turns upon the question of safety in handling dynamite.

Hynes Car Replacer.

The accompanying sketches represent a car replacer patented Aug. 13 last by P. W. Hynes, wrecking foreman of the Burlington, Cedar Rapids & Northern, at Cedar Rapids, Ia.

As will be seen by the larger scale drawing, the top surface of the replacer is beveled. The lower side is placed next to the rail, and should be just high enough to raise the tread of a wheel to its proper level while allowing the flange to drop into place. An ordinary "wrecking frog" is shown in the smaller scale drawing attached to the opposite rail. The beveled surface of the replacer causes the wheel to slide by gravity toward the rail, and this tends to relieve the strain on the "frog" under the opposite wheel, so that it will be less liable to overturn or break.

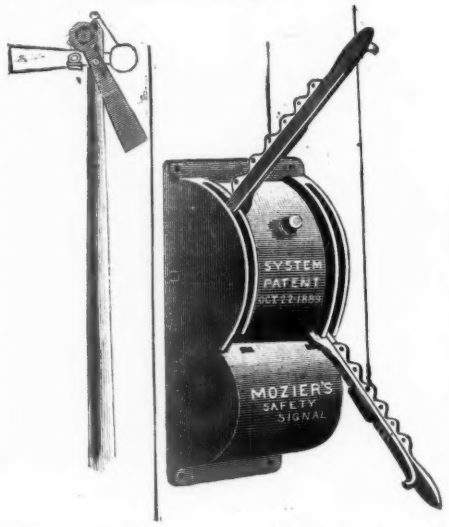


This device is of simple construction. The bottom plate is half-inch iron, 30 × 6 in.; the filling is of oak and the top plate is of steel, the whole being strongly bound together with iron rivets. The bottom plate is provided with studs to catch in the ties. The replacer weighs from 55 to 60 lbs., and can be easily made by any railroad company, as it requires no special tools, and any ordinary workman can put it together. It is not intended to supersede the present car-replacing appliances of any road, but to supplement them and increase their efficiency. In cases where trucks require to be turned or slewed under loaded cars or engines, by the use of two of these replacers it is easy to get the trucks into line, and with one of them and a common car frog the trucks can be replaced on the track without damage, in short time and with little labor. This replacer is well adapted to six-wheeled trucks or the heaviest engines. There are no clamps or loose parts to lose or break. It can be placed wherever wanted, on ties or on blocking, and the studs in the bottom will hold it there. Being only 30 inches long, it is well adapted to use for replacing consolidation engines, or others with wheels close together. It is a practical success, having been used on the Burlington, Cedar Rapids & Northern for nearly two years.

A common "frog," about 32 × 2⅜ × 2½ in., with a movable clamp to catch over the rail (which can be made by any railroad company for $1.50), and one of these car replacers will make a cheap and effective car-replacing appliance.

Mozier's Safety Fastener for Train-Order Signals.

We present herewith a perspective view of the apparatus devised by Mr. A. M. Mozier, Superintendent of the Western Division of the New York, Pennsylvania & Ohio, for aiding the memory of telegraph operators in changing signals from "safety" to "danger" after the passage of trains. The purpose of this device was explained in the *Railroad Gazette* several weeks ago. Since then it has been constantly in use in the office of the New York, Pennsylvania & Ohio at Mansfield, O., and Mr. Bahmler, the operator, says it relieves him of half the work and all the responsibility.



Mozier's Safety Fastener for Train-Order Signals.

The illustration shows one of the handles fastened down, holding the signal at "all clear," and the other unfastened and pulled up by the automatic movement of the signal arm to "danger." The internal mechanism is very simple. Two wires, one from each side of the telegraph key, are run to contact points within the iron box. The lever, by which the cord connecting with the semaphore is pulled down, is fitted with a catch rod similar to that on the reverse lever of a locomotive. This rod falls into the slot at the lower extremity of the opening through which the lever moves and in so doing both fastens the signal at "clear" and depresses a metal strip which makes an electrical connection between the two wires just mentioned. This connection cuts out the transmitter (key), and thus as long as the signal is at "clear" the operator is unable to use the key, and therefore can send no communications. He can hear what is going on upon the wire, as his receiving instrument is not cut out, but he cannot accept a train order, binding himself to hold a train, until he puts his key again in circuit by unfastening the signal, which then goes to "danger."

The machines are made with malleable iron levers, slides and pallets. Two, three or more pairs of contact points may be provided, so that the movement of the catch rod will act as a cut-out for as many keys as it may be desirable to protect.

As is well known, the fastening of a signal at "all clear" is, under ordinary circumstances, a dangerous proceeding, because the operator may forget that it is so fastened and allow a train to pass when it ought to be stopped for orders. The Standard Code provides that the train-order signal shall never be fastened except when the operator is off duty. But as this provision for safety makes very exacting demands upon the operator, engrossing an appreciable share of his time which might profitably be employed at other work, the "safety fastener" has been got up to enable him to perform this duty with the minimum expenditure of time, while at the same time affording a valuable check against forgetfulness.

Manson's Train Tablet Exchanging Apparatus.

Our readers are familiar with the fact that in working single track lines by the staff system the English railroads make use of tablets or tickets as an auxiliary to the staff. The latter is somewhat bulky, and where two or more trains are to follow one another in the same direction, all except the last one are given the small and convenient tablet instead of the staff. This practice has led to the use on some lines of tablets exclusively, the same provisions for safety being readily adapted to the change. One of the chief objections to the use of any system of this kind is the necessity of getting a new staff at each station which a train passes. If there are meeting points every five miles, a train running over a 25-mile line must deliver its staff or tablet, and receive a new one in exchange, at each of the four intermediate stations, even if there be no other train on the road at the time. This fact, together with the large number of meeting points on many roads where there is no telegraph office and no man in charge, is doubtless one of the reasons why the staff system has not been regarded with more favor in America.

These objections, especially the necessity for reducing speed to exchange tablets where otherwise no slackening would be necessary, have been felt in Great Britain, and Mr. J. Manson, Locomotive Superintendent of the Great North of Scotland, has devised a simple apparatus for making the exchange of tablets while a train is running at 30 miles an hour, or faster. The apparatus consists essentially of horizontal arms projecting from the locomotive cab and from an iron standard fixed 4 ft. 8 in. from the rail. Both arms are movable horizontally, and when not in use that on the engine is drawn in while that on the ground is drawn away from the track. The arms carry a fork, shaped like a tuning fork, and the principle of operation is similar to that of the familiar mail catcher in use in this country, though, by the aid of simple springs, the operation is made positive and no manipulation is necessary until after the train has passed. Each apparatus has both receiving and discharging forks. Several months' experience has demonstrated the practicability of the machine, even at speeds considerably higher than 30 miles an hour.

Some Recent Types of Locomotive Boilers.

We show herewith two boilers of recent design which it is expected will give good results in abundant steam supply with economical use of fuel. The first (fig. 1) is what is known as the "class H" boiler, used on the Chicago, Burlington & Quincy. These engines have cylinders 19 in. × 24 in. and three pairs of drivers varying in size as the engines are used for passenger or freight. The boiler, as is seen by the engraving, is of the Belpaire pattern and rests on the engine frames. The position of the brick arch, the arrangement of the air supply and the general dimensions are fully shown. The ratio of the area of the air-supply openings above the fire through the door, at the back end, and through the sides of the fire box amounts to $\frac{1}{150}$ of the grate surface. The boiler is designed to carry 160 lbs. of steam while working. The following are the dimensions of the boiler heating surfaces and air-supply holes.

Heating surface:	
Fire box	126 sq. ft.
Tubes	1,380 sq. ft.
Total	1,506 sq. ft.
Grate surface:	27.1 sq. ft.
Air inlets, area:	
88 ⅝-in. holes in stays at sides of fire box	9.8 sq. in.
20 9-16-in. holes in stays at end of fire box	5.0 sq. in.
39 ¾-in. holes in fire door	17.2 sq. in.
Total	32.0 sq. in.
Holes in fire door:	
8 1½ in. holes outside	14.2 sq. in.
39 ¾-in. holes inside	17.2 sq. in.

The general performance of these boilers is reported as very satisfactory, showing a high evaporation, and with careful firing almost an entire freedom from smoke when burning Illinois and Iowa coals. It will be noticed that this construction presents three of the elements necessary for the successful combustion of bituminous coals, *i. e.*, a large grate surface allowing a thin fire and slow draft, air supply above the fires to mingle with the hydrocarbons driven from the surface of the burning coal and a large amount of room in which to complete the combustion of the gaseous mixture before reaching the tubes. The success with these engines has been such that the road is fast introducing them for all its heavy passenger and fast freight trains.

Fig. 2 represents an experimental boiler built to obtain for the "class A," eight-wheeled engine, on the same road, some of the advantageous features of the class H boiler, still, however, using the deep box dropping between the drivers. The grate surface is virtually the same as for the standard class A engine, having 17-in. × 24-in. cylinders. It will be noticed that a large air supply has been arranged for in this boiler, being probably a surplus over the amount needed; the air openings above the fire equaling $\frac{1}{5}$ of the grate area. The same average travel is obtained for the burning gases that is found in the class H fire box. This is done by setting the fine sheet 24 in. forward, thus forming a combustion chamber 4 ft. 8 in. from the top of the brick arch to the tubes. In experimenting the large air holes can be closed with plugs, either solid or with smaller holes drilled through them, so that the air supply can be varied in any proportion. When running with all the large holes plugged in the sides and under the footboard, the ratio of the remaining air passages to the grate surface is $\frac{1}{5}$. The engine has high exhaust nozzles and a straight stack. The following are the dimensions of the boiler heating surface and air-supply holes.

Heating surface:	
Fire box	128 sq. ft.
Tubes	952 sq. ft.
Total	1,080 sq. ft.
Grate area:	16.8 sq. ft.
Air inlets, area:	
96 ⅝-in. holes in stays at sides of fire box	10.6 sq. in.
4 2-in. tubes at sides of fire box	10.2 sq. in.
6 2-in. tubes at end of fire box	15.3 sq. in.
39 ¾-in. holes in fire door	17.2 sq. in.
Total	53.3 sq. in.
Holes in fire door:	
8 1⅛-in. holes outside	14.2 sq. in.
39 ¾-in. holes inside	17 2 sq. in.

The working of the engine, which, however, has been out of the shop but a short time, is quite satisfactory, though it will take time to make comparisons between it and others of the standard class A type. Experience with this engine, as well as others in the system, including the class H engines, goes far to confirm the

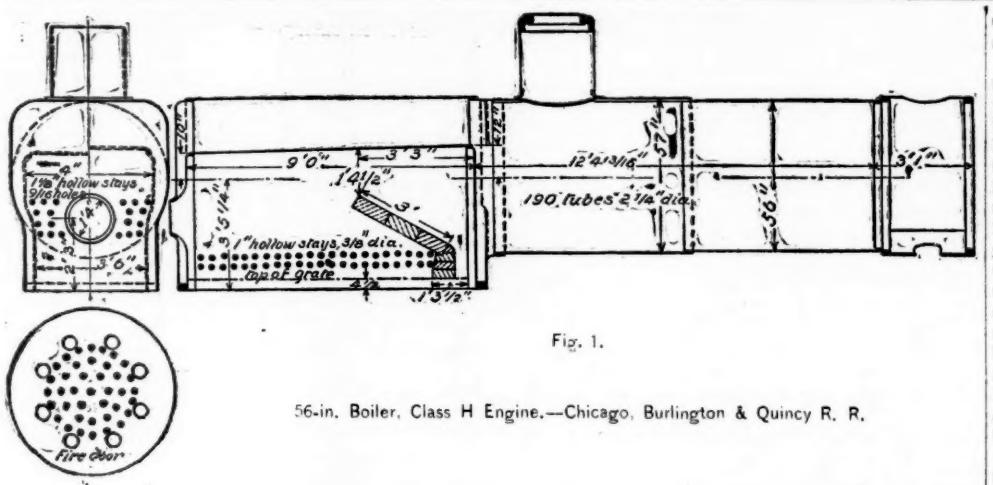


Fig. 1.

56-in. Boiler, Class H Engine.—Chicago, Burlington & Quincy R. R.

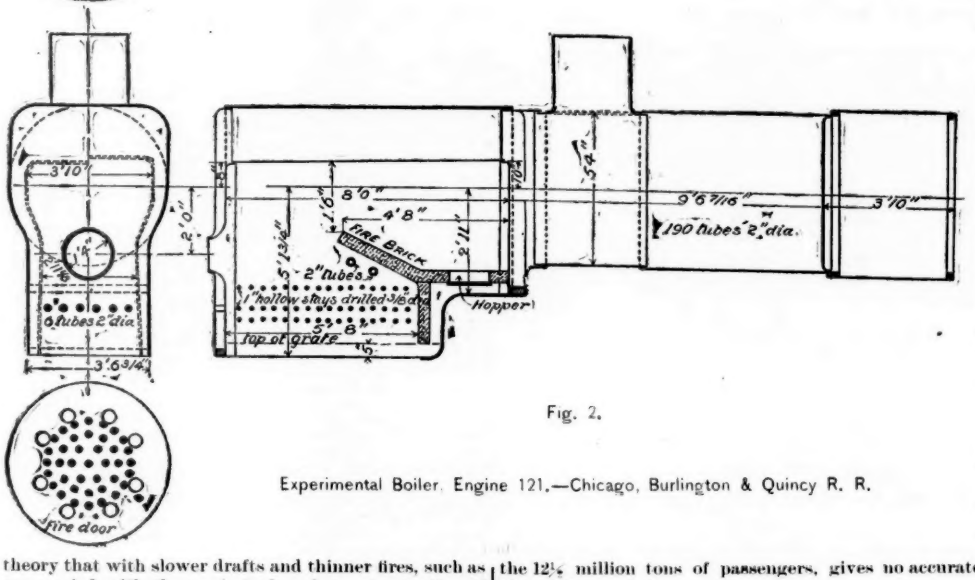


Fig. 2.

Experimental Boiler, Engine 121.—Chicago, Burlington & Quincy R. R.

theory that with slower drafts and thinner fires, such as are carried with the open stack, a larger proportion of air can be supplied through the grates than was the case with the stronger draft, shorter grate, thicker fire and diamond stack of the old type. It also shows that an engine of the class H type, in which the grate surface has been increased in greater proportion to the cylinder area than with other classes of engines, a thinner fire can be carried, and therefore a smaller ratio of air-supply area above the fire is needed. This has been found the case in Wooten engines burning slack bituminous coal, having a much larger grate than the class H engine, and also a long combustion chamber and short tubes. In the Wooten is found an engine giving good results with an inferior fuel, without smoke, and yet needing a much smaller proportion of air supply over the fire.

In experimenting with various classes of boilers, both in regard to the air supply and length of travel of gases to the tubes, it will be found that the larger the percentage of fixed carbon the smaller will be the amount of air needed above the fire, and the shorter the flame-way can be made.

Tonnage of Elevated Railroad Trains.

Mr. A. Fransioli, Mileage Clerk of the Manhattan (Elevated) Railway of New York City, has computed the total tonnage of equipment and passengers passing over the lines of that company during the last fiscal year (to Sept. 30, 1889), and produces some large figures. The total tonnage of equipment, which includes the weight, empty, of each train that made a trip was, 93,766,224 tons of 2,000 lbs. each. Some details are given in the accompanying table. The passenger tonnage is computed on a basis of 140 lbs. to each passenger. The distance traveled by passengers cannot be ascertained, so that the daily average (291,318 tons), given in the table, which includes the 12½ million tons of passengers, gives no accurate idea of the work done.

The average weight of engines is 40,590 lbs., and the average weight of cars (empty), is 28,500 lbs., which makes the average weight of rolling stock passing over the whole road (34 miles) daily about 50,714 tons. This is about equal to 24 trains, of 300 tons, daily, between New York and Boston, 234 miles.

MANHATTAN RAILWAY COMPANY.

Statement of weights of rolling stock and of passengers passing over the company's structure during the fiscal year ending Sept. 30, 1889.

LINES.	Tonnage of equipment. Engines.	Tonnage of equipment. Cars.	Passenger tonnage.	Grand total tonnage passed over structure.	Engine mileage.	Car mileage.
					Miles.	Miles.
Second Avenue	3,898,020	10,965,916	2,317,835	17,181,771	1,814,709.06	6,508,516.42
Third " main line	6,247,126	20,093,554	4,894,731	31,235,411	2,665,472.52	11,187,127.22
" " branches	8,814,930	9,046,641	.....	17,861,571	108,460.56	158,898.98
Sixth " main line	6,268,192	18,406,924	4,083,059	28,758,175	2,812,237.44	11,049,435.42
" " branch	204,898	143,868	.....	348,766	4,036.40	4,036.40
Ninth "	2,674,475	7,001,680	1,269,196	10,945,351	900,031.56	3,301,496.18
Totals, main lines	19,087,813	56,468,074	.....	88,120,708	8,282,531.58	32,046,575.24
Totals, branches	9,019,828	9,190,509	.....	18,210,337	112,496.96	162,935 38
Totals, main lines and branches,	28,107,641	65,658,583	12,564,821	106,331,045	8,395,028.54	32,209,510.62

Average weight passing over structure daily ..... 291,318 tons.
" " " " " monthly ..... 8,860,920 "

600 metres long, calculated for a train of 500 cars at each station.

As to the engineering structures, as it was a question first of all to hurry the work ahead, to be perfected afterwards, a great many temporary bridges in wood have been built. Permanent bridges having a span of less than 14 ft. have been constructed of wood also. It is expected that they will last 15 years. A uniform type of metallic bridge has been adopted; the span is invariably 14 ft., whatever the length of the bridge. The piers are formed of hollow cast-iron piles pointed with steel and braced together. They are sunk in the clay or sand to a depth of two metres by means of a ram, and require 36 hours for the operation. To give an idea of the cost of this method of construction, which is very solid, it may be mentioned that for a bridge 224 ft. long, 20 kilometres beyond Merv, the cost was 18,000 roubles (about 879 per running foot), and that, notwithstanding a transport of 140 kilometres beyond the Caspian. The abutments of all bridges, temporary or permanent, are of masonry or burned brick.

Engineering constructions are few as far as the Amoo beyond, and as far as Samarcand, they average three or four per kilometre.

Three temporary wooden bridges merit special mention; those over the Tedzen, Moorghaub, and over the Amoo. The Tedzen bridge at Karribend has a total length of 347.68 ft. It is formed of 20 rows of six piles 16.4 ft. apart. The second bridge, that of Merv, on the Moorghaub, is only 196.8 ft. long. Lastly, the bridge over the Amoo is the most important. This river has a bed a mile and one-quarter wide, but its banks being only from 1 metre to 1½ metres high, in times of freshet the inundation extends back as far as a mile and one-quarter from its shores.

At first it was the intention to utilize an island and provide a steam ferry-boat, which would have cost only $60,000; but between the times of freshets bars form in the bed of the river and this project was impracticable. The total length across the Amoo is about 13,120 ft., of which about 6,225 ft. to cross the three arms of the river. The islands are crossed on embankments. The bridge was constructed after the plans of Engineer Balinski. The length of the spans is 27.97 ft. They rest on piers composed of five piles each; the height of the piles is 38.54 ft., and they are sunk 3.6 ft. into the bed of the river, composed of a thin layer of loam and sand resting on a bed of clay.

There is a difference of 5 ft. between high and low water marks; 3,330 piles were used. In the part which crosses the principal arm of the river, to permit the passage of boats, is an opening spanned by a Howe truss. The construction occupied three months and cost $1,000,000, not including the cost of transportation. It is expected that this bridge will last from 12 to 15 years.

The lack of water has been one of the greatest difficulties to overcome. It has been necessary to establish at Mikhailov a distilling plant with a capacity of 132,000 gallons per 24 hours. Water has also at times been brought a great distance from a river or from a spring. There are distances of 45½ to 110 miles without water. Water in these cases is brought like petroleum, in wood or iron tank cars holding about 2,100 gallons each. The attempt has been made, but so far without much success, to obtain water by means of artesian wells, and at times it is necessary to use salt water for the generation of steam, which necessitates cleaning the boilers after a run of from 375 to 450 miles.

A passenger train leaves Ouzoun-Ada daily for Amoo-Darya, and vice versa. The speed is only 13 miles per hour, including stops. Temporarily, two passenger trains are run weekly between Amoo-Darya and Samarcand, at a speed of 10½ miles per hour; and days when the passenger trains are not run a passenger car is attached to the freight trains. The passenger cars used are the same as are used in Russia, and each train is provided with a dining car. The locomotives weigh, without tender, 30 tons; six wheels of small diameter, coupled.

For fuel the residue of Baku petroleum is used. Petroleum has been found also on the line of the railroad, but the flow is variable, and so far the wells have been little worked.

For the benefit of the Musselmans special cars with broad and low benches and a compartment for performing their ablutions have been provided, and closed and barred cars have been reserved for the women. Pamphlets reciting the value of the new road for pilgrims have been distributed for promoting the passenger business.

The Transcaspian Railroad.

The following details relating to the Transcaspian Railroad are taken from the *Bulletin de la Commission Internationade du Congrès des Chemins de Fer*. There are no curves of less than 1,000 metres radius, and the numerous tangents have a length of from 30 to 40 versts (one verst = .6629 mile). The maximum grades are on the shores of the Caspian, in the section of which the construction dates back to 1880. At first they were one in 55, but they have been brought down to one in 100, and one in 83, and on other portions of the line they do not exceed one in 166. The gauge is 5 ft. 1.6 in.

The calculations are for two tracks, but the roadway at present is established for one only. The cuts in the sand have a slope of 45 degrees, and the sandy embankments are 2 vertical to 3 horizontal.

The rails are of steel, Vignoles section, and weigh 32 kilograms per metre (about 64 lbs. per yard). Their cost is high, because they are bought by the Russian government from domestic manufacturers in order to encourage manufacture. The ties come from South Russia, and cost delivered at Ouzoun-Ada 1½ rouble each (about 87 cents). About 2,100 per mile are used. In some sections ties are replaced by blocks in asphalt beton, which serves well.

Turn-tables are replaced by Y's, which offer no inconvenience, as room is not wanting. There is a side track

The Proposed Transcontinental Railroad in Guatemala.

The New York *Times* gives some particulars of the project for a railroad from Guatemala City to the Gulf of Mexico, which, with the existing (Guatemala Central) line to the Pacific, would make a continuous railroad from ocean to ocean. The French capitalists referred to purchased the Central, as outlined in the *Railroad Gazette* of Oct. 25 last, the American owners, Messrs. Huntington, Morton, Bliss & Co., and others, having protested against the new road as an infringement of their contract. The price received by them is said to have been $4,000,000. The negotiations were conducted through the banking house of Lefevre, of Paris. The *Times* continues:

The sale of this railroad removes from Guatemala the only large American interest in the country, and puts the Germans, with their coffee investments, and the French in practical control. The Lefevres advance about $22,000,000 to build the line, the government of Guate-

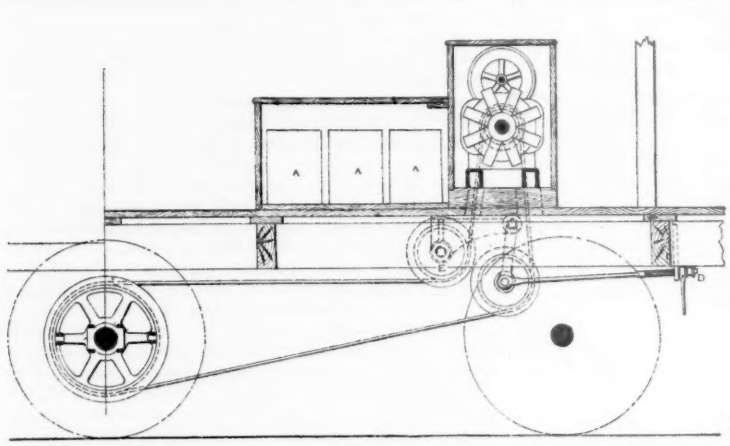


Fig. 1.

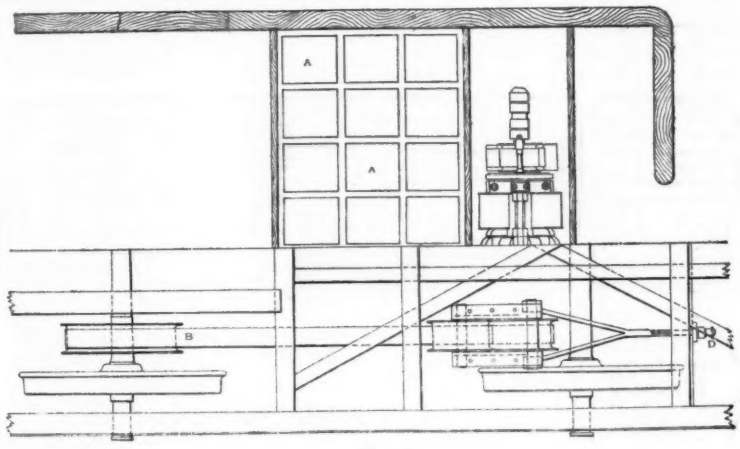


Fig. 2.

ARRANGEMENT FOR TAKING POWER FROM THE AXLE FOR ELECTRIC LIGHTING.

LONDON, BRIGHTON & SOUTH COAST RAILWAY.

mala issuing an equal amount of six per cent. guarantee interest bonds, but the French are to control the road for the first forty years. This plan of railroad building is the same as that which ruined Honduras financially and saddled her with a debt of $24,000,000 in return for two streaks of red rust about twenty miles long, known as the Interoceanic Railroad of Honduras; and if in forty years the Frenchmen do not own Guatemala it will be because they cannot compute interest or because some future revolution will repudiate the present contract.

Going northeast from Guatemala City, the line will traverse an unproductive country, with hardly enough soil covering the bed rock to grow a potato. When once fairly in the mountains there are very heavy grades. The eastern slope, where the grants of land are situated, is low and unhealthy, and fit for banana planting only. On the other hand, the road will have a fine harbor front, probably at Puerto Barrios, where docks can be built in 25 ft. of water, at which steamers may touch, thus avoiding the transfer of freight in lighters. Imports to Central America from the United States now go from San Francisco, but the new road would turn much of this trade to New York

The recent sale of the Champerico Railroad, owned in San Francisco, and that of the Guatemala Central will undoubtedly decrease the influence of the United States in the country. These lines were built during the administration of President Barrios, and to induce American capital to come to Guatemala he had to grant most liberal concessions. When the Americans had fairly got their money into the country the gratitude of the government began to cool. It was only by continual lobbying and official protests that the vaiidity of the contracts was preserved. The present administration has paid the interest on the foreign debt, but it did so by failing to pay on the debt held at home.

In this recent step toward the development of the country very little has been forgotten. Railroads to tap coffee districts are projected into every nook and corner, new harbors are to be constructed and docks built at which steamers may discharge cargo, electric light plants are desired in every town, street railroads are to be put down in the large places, and improved machinery is to be put up on every plantation. In all of these enterprises there is no reason why the United States should not be the source of supply.

From another account we learn that the Gulf terminus may be at Port St. Tomas instead of Barrios, as stated by the *Times*. At St. Tomas a pier 2,500 ft. long will reach 30 ft. depth of water, and the distance to New Orleans is only about 1,000 miles. From St. Tomas to Guatemala is 200 miles, and the existing line thence to the Pacific is only 75 miles long. The summit, which is on the existing line, is 5,010 ft. above the sea. Of the 200 miles of the new line 60 is low and partly swamp, 100 barren plains, 40 very rough requiring tunnels and many viaducts. A good judge estimates that $7,000,000 would build the line if the work were economically managed.

Electric Train Lighting by Power from the Axles.

Various schemes for lighting railroad trains by electricity are in use in Europe in which the power is taken from the axles of the train which is to be lighted. One of the most successful of these is in use on the London, Brighton & South Coast, and is the device of Mr. Stroudley, Locomotive and Carriage Superintendent of that line. The construction of the driving mechanism is shown in the illustrations.

In fig. 1 can be seen in side elevation the arrangement of storage batteries, dynamo, belts and pulleys. In fig. 2 the same parts are shown in plan, and fig. 3 is a cross section of the car showing clearly the driving apparatus.

The storage batteries are marked *A* in figs. 1 and 2. They are placed close to the dynamo. The dynamo is driven by means of endless belts passing over large pulleys *B*, placed on the axle, as shown. The belts are two in number and drive small pulleys on each end of the armature shaft, shown at *C*, fig. 3. In order to take up the slack of the belt a tension device is arranged, as shown at *D*, fig. 1, consisting of a nut with a long handle, which when rotated tightens a pulley which is hung on a swinging arm, as shown. An idler pulley is placed at *E*, fig. 1, to change the direction of the belt.

This device has been in operation for some time and has worked well; but it must be remembered that the cars on which it is used have fixed axles which do not swivel, and the cars have only a small amount of lateral motion, and this renders possible the construction

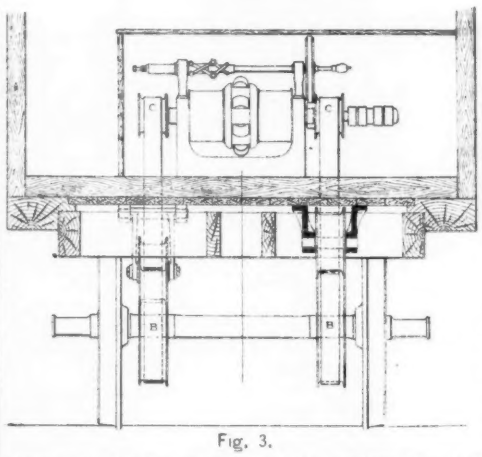
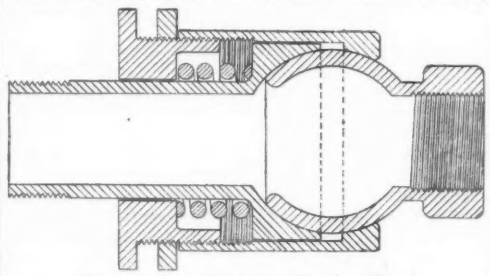


Fig. 3.

shown. It will be noticed that the pulleys have high flanges and that every precaution is taken to prevent the belts from running off or becoming loosened.

Aldcorn's Joint for Steam Pipes.

The ball joint shown herewith is one of novel design, intended especially for the connections between the steam-heating pipes of passenger cars. This joint is the invention of Mr. Thos. Aldcorn, Master Mechanic of the West Shore Railroad at New Durham, N. J. It consists,



Aldcorn's Joint for Steam Heating Pipes.

as shown, of six pieces; a ball and socket, a clamp nut, spring, and check nut. This is one of the most satisfactory ball joints for the purpose yet put out, and has for its principal advantage an automatic take-up for all wear of adjoining surfaces. Its construction is so simple and so easily understood from the accompanying illustration that no further description is necessary.

Chemistry Applied to Railroads.*

The chemist having been secured, one of the first things that is usually given him is to explain some peculiarity that has been observed in the service. The first work done after the laboratory of the Pennsylvania Railroad was established was to make an investigation into the reason why the valves and steam cylinders corroded so badly. The ordinary life of a valve was about a year, and whenever an engine came in for repairs, there was always more or less corrosion about the seat where the steam-chest rests on the cylinder. A careful study was made of the conditions, and the conclusion reached was that the difficulty was due principally to the acids in the tallow used for lubricant, and that corrosion was assisted by the sponginess of the castings in the valves, since the cavities in the castings afforded places for the lodgment of the tallow. At the time this investigation was started no record could be found in the literature of the case to show that the fat acids characteristic of tallow would corrode iron at the temperature of steam cylinders, and direct experiments were made with these acids demonstrating this point. The explanation of the difficulty having been obtained, of course attention was directed toward securing a mitigation of the trouble.

As another illustration of the application of chemistry to bad results obtained in service, the following may be cited: One of the special cars after having been cleaned by the car-cleaners was noticed to look badly, and on examination by the foreman of painters, it was declared that the varnish had nearly all been removed by the cleaning. As a matter of discipline, the foreman car-cleaner was asked to explain why the varnish had been so badly used, and he claimed he could do no better with the soap he had. A sample of the soap used was submitted to the chemist, who found not less than 3 per cent. of caustic soda and 7 per cent. of carbonate of soda, in addition to the soda combined with the fat as a legitimate soap. This, of course, explained the peculiarity and justified the foreman, as the soap solution used in washing the car was in reality a concentrated solution of sal soda and lye, which readily disolves varnish.

Another field for the activity of the chemist of a railroad is to protect against fraud. Not a few cases could be cited, showing attempts to sell at excessive prices, under some special name, common articles, which can be obtained in the market at very small figures. One of the most common of these attempts is that of selling some cheap materials for use as anti-incrustating boiler compounds. Dry material has been offered at 25 cents per pound, which on examination has been found to be nothing but sawdust and sal soda. Again, boiler compounds have been offered at 50 cents per gallon, which have been found to be apparently spent tan liquor, containing a little sal soda, 95 per cent. of the material being water simply.

Another line of activity of the chemist is to prove whether the assertions made by commercial men are true or false. The representative of a certain grease offered for general lubrication recently called upon us, to set forth the merits of his wares. In the course of the conversation with him, it was remarked that the usual difficulty with regard to greases, and the cups which were usually used for feeding them, was that, upon the journal getting a little warm, the grease would melt and all run out, leaving the journal without any lubricant whatever, the ordinary control over the feed, in the case of grease, being obviously inapplicable. To this statement the representative of the grease, with the utmost coolness, and with the evident expectation of being believed, remarked that "This grease is entirely unaffected by changes of temperature." It is quite the custom when a new party desires to furnish materials for the use of the Pennsylvania Railroad to require him to send a sample of his material for examination before the purchasing agent feels willing to place an order with him. The saving in annoyance and vexatious disputes by this method is no small relief, not only to the purchasing department, but also to those who have to use the materials.

Another field of activity for a good chemist on a railroad is to make investigations, to guide the practices of the road and the expenditures of money. One or two illustrations will probably make this point clear. It has for quite a long time been the practice of the Pennsylvania Railroad to establish no new water stations until all the sources of water supply in that region have been examined as to the scale-making properties of the waters, and it is known that much good has resulted from this examination. Oft-times an expenditure of a number of thousand dollars, and the establishing of a poor water station, is avoided by so simple a thing as the determination of the total solid residue left on evaporating a sample of the water. The saving in boiler repairs and coal resulting from only using the best water accessible is hardly capable of calculation, but those who are best informed on the subject will not hesitate to assent to the statement that it amounts to thousands of dollars per year on any railroad having as many as 100 locomotives.

Another example in this line will make the matter still more clear. Some four or five years ago, investigations were made in the laboratory of the Pennsylvania Railroad, on the composition of the oil burned in the hand lanterns and elsewhere, and known in railroad language as signal oil. This oil, as is doubtless well known, is a mixed oil, the principal constituents being either lard, colza, or mustard-seed oil, together with varying proportions of petroleum distillate, known in the market as 300 degree fire-test oil and as head-light oil. The question to be decided was, What mixtures of these various oils will give satisfactory results at the least possible cost? To solve this problem analyses of various mixtures of signal oil obtainable in the market were made, and then new mixtures were made in various proportions of the oils mentioned above, which were subjected to burning tests. As a result of the whole work, which extended over a period of a month or two, a formula was developed which gave an oil that was perfectly satisfactory by all tests, and at the same time produced a saving at the prices then prevalent of about ten cents per gallon over the practice then in use. Oil was made according to this formula, and distributed to the men without their knowledge that any change had been made; and quite to the gratification of those authorizing the change, and somewhat to their astonishment, no increase of complaints in regard to oil could be observed. The economy in operating expenses produced by this change amounted to about $15,000 per year.

* From the *Railroad and Engineering Journal*. By C. B. Dudley, Chemist, and F. N. Pease, Assistant Chemist, of the Pennsylvania Railroad.

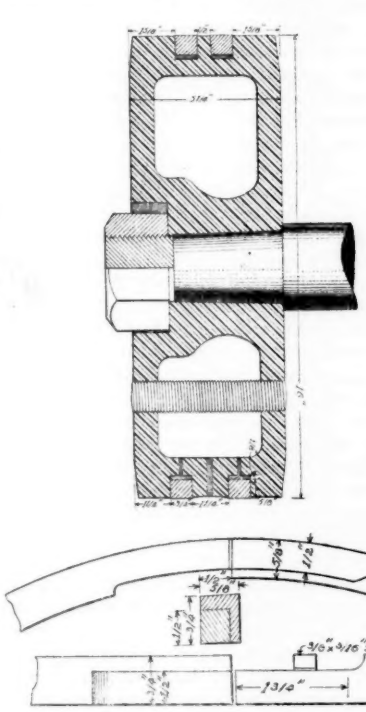
During the nearly 14 years' existence of the Pennsylvania Railroad laboratory, chemical specifications for only about 25 different commercial products have been prepared. In later articles of this series an attempt will be made to give the reasons why, and a complete explanation of, the specifications which have been prepared.

The preparation of the specifications, although a necessary preliminary, is only a small portion of the most important work of a railroad chemist. As long as competition in business is as severe as it is at present, there will be constant temptation on the part of the manufacturers to furnish inferior materials, even though the material is bought on specifications, and here comes the most voluminous work of the chemist—namely, the examination of samples taken from shipments, to see whether they fill requirements. In the Pennsylvania Railroad laboratory, at the present time, four chemists are engaged on this work the largest portion of each working day. Samples from some 4,000 shipments per year are examined, the average number of determinations per sample being about five. This work, in addition to the examination of miscellaneous samples of material, either for investigation or to settle some point connected with the service, makes the total number of determinations in the Pennsylvania Railroad laboratory somewhere between 25,000 and 30,000 per year.

The query will naturally arise in the mind of every railroad man, whether specifying the quality of material does not necessarily increase the price, and, therefore, whether, after all, there is any real advantage in specifications. It is gratifying to be able to state that the experience of the Pennsylvania Railroad, for now nearly 14 years, is in general, that the price is not seriously affected either way by the preparation of specifications. Indeed, in many cases materials on specifications are obtained at lower rates than prevailed before the specifications were issued. The principal reasons for this seem to be, first, that manufacturers, knowing what is going to be used, can provide themselves with the raw materials in larger quantity, and thus get the benefit of reduced rates, and second, all manufacturers in the same line, being required to bid on the same requirements, naturally bring their price just as low as it is possible to get it, in order to be sure of getting the business. Whatever the cause, the fact remains.

The American Balance Piston.

The piston shown herewith, which has for its principal feature the balancing of the weight of the head in the barrel of the cylinder, is in use on several roads on the extreme western coast of the United States. It is a novelty, the patent claims for which are about as follows: "A piston for steam engine cylinders having packing rings set obliquely and divergently, and a recess formed between them at the part of greatest divergence in combination with ports and passages which connect the said recess with the steam



space of the cylinder outside of the piston." The object of this design is to overcome the wear of the piston head on the bottom of the cylinder. There are no extra parts beyond those of the regular snap-ring packing, the only difference being that the grooves for the snap rings are cut at a greater distance apart at the bottom than at the top. This results in a greater area on the bottom between the rings. When steam is admitted from the inside of the piston head to this space, between the rings, the greater area on the bottom carries the piston off from the bottom of the cylinder.

In actual working it is found that the piston is off the bottom of the cylinder when making an ordinary stop, and in descending long grades the piston is kept away from the bottom of the cylinder by the admission of a little steam.

The cuts clearly show the construction. The packing rings, which are ¾ in. wide, are 1¼ in. apart on the bottom and only ⅛ in. apart at the top. It will be noticed that there is a small hole at the bottom of the piston leading into the space in the piston head which conveys steam from that space into the area between the packing rings. The steam finds its way into the space in the piston head around the packing rings and through the small hole at the back, which is shown in the cut. The detailed illustrations show clearly the construction of the packing rings.

This device is manufactured by William J. Thomas, Saucelito, Cal.

THE SCRAP HEAP.

Notes.

The Missouri, Kansas & Texas has notified its passenger conductors that they must hereafter furnish bonds.

The old round house of the Baltimore & Ohio at Mt. Clare, Md., will be reconstructed and fitted with new machinery and be used as a supply shop. It will employ a large number of hands.

A dispatch from Lexington, Ky., says: "Twenty-seven freight conductors have been discharged from the Cincinnati Southern because they belonged to the Brotherhood of Railway Conductors. A strike may result."

The Intercolonial has purchased a large lot on Commercial street, Point Levis, and is laying tracks on it to faciliate handling trains without delay. At Moncton the company is erecting an engine house and other buildings which will cost $75,000.

The Louisville Bridge Co., the Pennsylvania Co. and other lines have been joined as parties defendant in a suit begun at Louisville, Ky., to contest their right to use the public streets for railroad purposes without having previously obtained the consent of the state railroad authorities.

James Montgomery, of East Millstone, N. J., has commenced suit in the United States Circuit Court at Chicago, against the American Live Stock Transportation Co., Nelson Morris, President, and against Nelson Morris individually, for damages to the amount of $150,000, for infringement of patents of Aug. 7, 1888, and Feb. 5, 1889, claiming that the Live Stock Co. had 500 palace stock cars constructed and, without his (Montgomery's) knowledge or consent, used his inventions in their makeup. Similar suits will be begun against certain railroad companies.

A Macon (Ga.) paper prints the following: Yesterday about 50 miles above Rome on the Chattanooga, Rome & Columbus, a narrow escape from death occurred. As the southbound passenger train from Chattanooga was in full speed, a man lying on the track was observed. The engineer put on brakes, but could not stop in time. The man woke and attempted to get off the track, but his right arm was cut off. The train was stopped to take him on, but he was badly frightened and ran as hard as he could. Passengers pursued him, caught him and put him on the train. At Lafayette they left him in the hands of physicians.

A strike on the Evansville & Terre Haute and the Evansville & Indianapolis, both in the "Mackey system," stopped freight traffic on these roads Dec. 30. The Master of Transportation recently issued a circular that trainmen who loitered about saloons would be discharged. Since that was done eight conductors have been relieved without charges being preferred. A committee asked Mr. Mackey that the men be reinstated until charges should be preferred against them, and that the Master of Transportation be suspended. Mr. Mackey declined and the men are out. The men say that it is the purpose to get rid of conductors who belong to the Brotherhood, which, unlike the Order of Railway Conductors, permits strikes.

Proposed International Monument to James Watt.

The proposal to erect a monument in Greenock as a memorial of James Watt has been before the public for a considerable number of years, but it now appears to have taken a definite shape and much greater magnitude, as it is suggested that it should be international. A local committee, composed of members of the Council of the Greenock Philosophical Society and other influential gentlemen, has been appointed to act with the co-operation of the Town Council, and there is every reason to expect that the movement will be successful, as already handsome subscriptions have been promised from London and other large centres in England and Scotland, as well as America and other parts of the world.

The White Sulphur Springs Accident.

The westbound express train, "the Fast Flying Virginian," on the Chesapeake & Ohio, was derailed near White Sulphur Springs, W. Va., on the morning of Dec. 28, and six cars were overturned, killing five passengers and five trainmen and injuring 25 other persons. The derailment occurred on an embankment, nearly 200 ft. high near Jary's Run, and the train was running 40 or 50 miles an hour. The cause of the derailment does not clearly appear. One account states that the sleepers were rotten, causing the rails to spread, while another states that an axle broke.

Kentucky Railroads.

The 10th annual report of the Kentucky Railroad Commission gives the mileage of the railroads in the state as 2,835, an increase of 232 miles over the previous year. One hundred miles are now under construction and expected to be completed early in the spring. The total gross earnings for the year amount to $14,400,996; operating expenses, $8,778,199, and net earnings, $5,893,177. The total assessed value is $44,690,903, and the value of the tax-paying roads, $32,174,272. The net earnings are 17 per cent. of the assessed value. The usual discrepancy in theestimates placed on railroad property by railroad commissioners and officers of the companies reporting is manifest in the returns for the past year. The assessment of the commissioners exceeds the aggregate valuation of the companies by $9,854,861. The commission gives full notes of its tours of inspection during the year, and discusses train accidents, safety appliances, rates on coal, bridges and state control. The report contains illustrations of several bridges and a handsome map made by the State Geologist.

Uniformity in Railroad Accounts.

Marshall M. Kirkman, in one of his recent books, has this to say on uniformity of railroad accounts:

It is neither desirable nor practicable that a particular method should be prescribed for keeping the accounts of railroads. It would stop development, prevent progress, deaden the efforts of individuals, fit the same hat to every head, and that head a very small one. Railroads should be left to keep their accounts in their own way. All that should be asked is that they keep them truthfully and accurately. The results of railroad operation should be stated uniformly. But the manner of arriving at such results concerns no one but the railroad companies themselves. It will be understood, therefore, that in writing a text book on accounts I do not wish to imply, even remotely, that a particular method should be observed by every company. The accompanying volume is designed to treat generally the questions it refers to and the subjects analogous thereto. It outlines a particular system, to be sure, but I do not pretend this system is the best. The value of a book of this kind lies in the suggestions it affords. It is not intended to be exhaustive.

A New Steamship Line.

The first steamer of the new line which is to run between New York and St. John, N. B., will leave New York early in March, and regular weekly trips will be made thereafter. The company has made arrangements for three first-class steamers of 2,000 tons each. They are to make the trip in 48 hours, and will stop at Cottage City, Mass., Rockland and Eastport, Me.

For Communication with South America.

The Colombia Railway & Navigation Co. has been incorporated in Virginia with a capital stock of $100,000,000. The company proposes to build a railroad from some point near the mouth of the Magdelina River, United States of Colombia, southward, to connect with the Peruvian and Argentine systems, now in operation or under construction. From the northern terminus of the line steamships are to be run to Florida and to New Orleans. Captain H. C. Parsons, of Natural Bridge, Va., is at the head of the enterprise.

Manslaughter by Electricity.

The Grand Jury of New York has brought in an indictment for manslaughter against Mr. Charles W. Pierce, of the Brush Electric Illuminating Co. It charges him with manslaughter in causing the death of Henry Harris, killed by an electric light wire Nov. 30 on Eighth avenue, New York City. The Grand Jury recommends legislative investigation into the business of the generation and distribution of electrical currents.

Russian Engineers in America.

Two civil engineers sent by the Russian government are visiting Canada and the United States for the purpose of making studies of railroads, with a view to getting information that will be valuable in the construction of a railroad through Siberia.

The Hudson River Tunnel.

At the annual meeting of the Hudson Tunnel Railway Co. the following directors were elected: H. W. Perkins, W. M. Force, A. B. Gibbs, H. S. White, F. P. Abbot, C. E. Welling, C. Sooysmith.

Work has been going on steadily since last May, when it was resumed. The tunnel has been pushed ahead about 300 ft. at the Jersey end since that time. About 200 men have been, and still are, employed, and work goes on day and night. The entire distance excavated at the Jersey end is now 2,050 ft. At the New York end work has not yet been resumed, but preparations for its resumption are under way. About 300 ft. at this end have been excavated. Of the entire 5,600 ft. between the New York and New Jersey shafts, therefore, about 2,350 ft. have been excavated, or a little more than half.

The approaches to the tunnel will each be about three-quarters of a mile long, and nothing yet has been done toward their construction.

A new contract has been made for carrying on the work with some change of method. The principal changes make the lining entirely of iron.

The diameter of the new cylinder will be about 20 ft. The tunnel thus far built is 16½ ft. one way by 18½ ft. the other inside the brick walls. An enlargement is being made at the head of the tunnel on the Jersey side preparatory to putting in new machinery with which to push the iron cylinder forward.

Alabama Railroads.

The annual report of the Alabama Railroad Commission will show 2,929 miles of railroad operated in that state June 30, 1889, an increase of 133 miles during the fiscal year. Of light railroads, called "dummy" lines, tnere are in the state now nearly 80 miles, most of it being in the vicinity of cities and used for suburban travel.

Kansas Railroads.

The annual report of the Kansas Railroad Commissioners for the year ending June 30, 1889, gives the mileage of railroad in the state as 8,755, an increase of 239 during the fiscal year. Thirty miles of the Hutchinson & Southern have been completed since the date of the report.

The following figures are given:

	1889.	1888.
Capital stock	$428,635,526	$363,977,327
Bonds	487,201,621	449,607,698
Passenger earnings	20,741,900	18,595,030
Freight earnings	56,970,096	....

The increase in all the items is abnormally large, because the Chicago, Rock Island & Pacific reports statistics this year that were not reported in Kansas in 1888. Excluding these, the earnings show a decrease of $1,477,447.

Railroads in San Salvador.

A letter from San Salvador, Central America, says: 'The railroad from Acajutla inland, is proceeding in this little republic, and, as fast as the resources of the country will permit it, we shall receive the benefit of better communication and the development that will follow the laying of the rails. The road is now in possession of the Government, the last payment having been made to the English contractors, the Salvador Railway Construction Co., Limited, and is at present being operated by the Department of Public Works.

"The line in construction from Ateas to Guarumal is making good progress, both tracklaying and grading going on. There are already subscribed $300,000 for the railroad from Santa Anna to Armenia, the total cost of which is estimated at $2,000,000."

Telegraph Lines in Texas.

The San Antonio & Aransas Pass Railroad has acquired control of the old Breckenridge Telegraph Co., in Texas. It will hereafter be known as the San Antonio & Arausas Pass Telegraph Co. The railroad company's charter does not permit it to operate the telegraph as a commercial line. The line now extends along the railroad from Laredo to Galveston, and arrangements have, it is stated, been made with the Mackay-Bennett Cable Co. by which wires will be run south from Kansas City to connect with those of the Mexican National road, giving direct communication with the City of Mexico. The amount paid for the old company's wires was $70,000. Its officers will be the same as those of the railroad.

RAILROAD GAZETTE

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At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Locomotive building has evidently not been quite as large in the year just ended as it was in the year preceding. The falling off in the product has not, however, been serious. In 1888 we reported 2,180 locomotives built by 17 firms. In 1889 we find 1,860 built by 16 firms. The product of the firms not reporting would probably not raise the output to 2,000. This is, of course, exclusive of engines built in railroad shops. Thirteen of the firms reported in both years. These built 1,794 locomotives in 1888 and 1,657 in 1889. It is quite evident, therefore, that there has been some falling off; but it was not enough to make dull times for the builders. Indeed, in the last quarter of the year they were generally very busy. The average yearly product of 19 firms for the eight years 1887–88 was 1,645 locomotives, 215 less than the 1889 product of the 16 firms now reporting. Only three of the 13 firms whose reports we can compare for the last two years show an increased product in 1889 over 1888. All of the others show a falling off of from 16 to 60 per cent. Although our returns of cars built in 1889 are not yet sufficiently complete for publication, it is apparent that the general course of that business has been like that of locomotive building. That is, there is a falling-off from the preceding year, but not a great one. Reports from about half the car-building companies show a decline of 20 per cent. from the product of 1888.

It is possible that there may be in Scotland next year a trial between English and American locomotives. Such trials would be of advantage to all concerned. It is hardly to be expected that the economy of either type would be much superior to the other when the loads to be hauled are in proportion to the capacity of the boilers of the engines; but one great advantage of a side-by-side comparison of locomotives as a whole and of their individual parts lies in the possible improvement in minor details. For instance, giving the American locomotives their just due, there can be no question but the English locomotives have larger and more durable wearing surfaces in proportion to the loads. Their driving boxes and shoes and wedges, while having less work to do, have over 50 per cent. more wearing surface. The ends of the connecting rods where the brasses fit are case-hardened, and throughout the machine it is just to say that greater attention is paid to the durability of the working parts in the English than in the American locomotive. However, on the other hand, our engines are superior in the general mountings of the boilers and in the accessibility of the parts for repairs. The conditions of service are not so different in England that the locomotives there used are necessarily different from ours. An engine which would work satisfactorily in America ought to work with equal satisfaction in Great Britain. The reverse is hardly true, yet those portions of the English locomotive which are more durable and are simpler and better designed could as well be used on our engines. The English locomotive costs something over $12,000 at a low rate for labor, while our own for harder service scarcely reaches $8,000. It is doubtful if the additional $4,000 is warranted by the increased durability of the English engine.

A question has been raised whether the scales used in America to weigh locomotives ought not to be made in sections, like those used in England and in France. At first thought it might seem as if there were many advantages incident to the use of such scales and methods of weighing, whereby the weight upon each wheel is given separately from and simultaneously with the weights upon the others. But the refinement would only lead to confusion after all, because the use of equalizers precludes the possibility of the weight upon the drivers being twice alike under the same general conditions. The purpose of an equalizing system is to distribute the weight equally, or unequally, as the case may be, but always in the same proportion, between the wheels. However, because the motion of the driving boxes in the jaws of the frames, and of the equalizers on their joints and bearings, can only be made at the expenditure of considerable force to overcome friction, it is evident that the equal distribution of weight will only be accomplished within not particularly small limits. Observations of many cases where locomotives were weighed, the drivers of which were equalized together, and therefore, but for the friction at the points before mentioned, would have had the same proportion of weight upon each, show that the only constant indication of the scales when an equalized locomotive is weighed several times in succession with the same load, is the total weight upon each set of drivers equalized together. In many instances the differences between the loads on wheels, due solely to the before mentioned causes, are as great as 1,000 lbs. Probably the greatest difference is liable to exist in the case of mogul locomotives where the truck is equalized with the front drivers. It is easily possible to so manipulate the engine, by running it over blocks or low or high places in the track before it is weighed, as to change the weight upon the front truck several thousand pounds, particularly if the engine is a newly fitted one. Experience, therefore, shows that the weight upon any individual wheel of an equalized system is liable to vary considerably even when the weight upon the whole remains unaltered, and these variations are caused by the natural action of the friction of sliding surfaces, and cannot, therefore, either be wholly removed or closely regulated. From this can be seen at least one reason why refinement in our locomotive weighing scales is scarcely necessary, and why it would not be productive of more useful results than the simple individual scales we are now using, while with the unequalized locomotives on European roads, the subdivided method of weighing might be advantageous to determine if any particular wheel or wheels were overloaded.

The Chicago Car Service Association has voted to hold carloads of coal three days where necessary. In other words, shipments will be held back that length of time in order to avoid crowding consignees. The preamble of the resolution embodying this decision states that three days' supply of coal is necessary "for the protection of the interests of the city." This action, when taken in connection with that of the New England roads in extending the limit of free detention, indicates a tendency to compromise with dilatory consignees rather than to be at the pains to settle the numerous contested cases on their merits. In other words, a strict enforcement of just demurrage charges would doubtless result in a large amount of negotiation concerning excessive charges and in demands for rebates on account of delays in transportation. A "horizontal" reduction is doubtless regarded by the railroad officers as the easiest way out of the complication. The Boston papers publish a report that the resignation of Mr. Shinn from the management of the New York & New England was on account of his enforcement of demurrage and of prompt payment of freight bills. It is claimed that this drove away business. As most directors generally look at gross earnings, and often at earnings only, this is no particularly surprising; but if we are to believe the published testimony of railroad officers, the enforcement of demurrage has not resulted unfavorably at other places, and there is no apparent reason why the New York & New England should find conditions different from those elsewhere. The Concord & Montreal has adopted demurrage rules in which five days' free detention is allowed. The charge for the first two days is 50 cents a day. This, it will be remembered, is the rate in the Colorado Association. The Denver papers report the first month's work of the last-named association. The average daily number of cars on hand at points within the association's territory has been decreased 725, and the total decrease, estimating cars as worth 50 cents a day, is calculated to be worth $14,560. At the beginning of November the average detention for each car was 11¼ days. This has been reduced to four days. A car service association has been established at Peoria, 16 roads being interested. The Mahoning and Shenango Valleys Association has chosen as manager F. G. Jewett, late Superintendent of the Chatauqua Lake Railroad.

Some of the Limits of a Law for Safety Appliances.

Two weeks ago we discussed somewhat the probability of national legislation for the protection of trainmen, and attempted to state some of the principles which must lie at the bottom of such legislation if it is to be effective. We assumed that legislation is inevitable, and that to be useful it must require power brakes on engines, and a continuous, automatic air brake and the Master Car Builders' coupler on all cars running in freight service. We assumed further that the law must prescribe a train brake that will interchange with the present standard.

Since that editorial was published we have addressed a circular to operating officers of many of the most important lines, asking (1) when compulsory equipment with automatic brakes and couplers should begin, if at all; (2) at what rate it should proceed; (3) if the roads could be required after some specified date to have enough air-braked cars in each train to control the train; and (4) if our suggestions as to the brakes and couplers to be prescribed are approved. We have received many answers. They are not numerous enough to carry much weight, considered merely as a vote; but from the knowledge, experience and influence of the officers who have replied, the answers are of great weight as indicating the state of opinion among those who, by virtue of their official position or professional standing, are powerful in directing the policy of the companies in technical matters.

With but one exception the answers approve of our suggestions as to the brakes and couplers to be used. One officer says that the "automatic couplers for freight cars are not yet sufficiently perfected for a standard to be adopted." Although his company is one of the most important in the United States as to mileage operated, it has no cars equipped with the vertical plane coupler. There is no doubt that the Master Car Builders' coupler, as now made, is often deficient in strength, but its weaknesses are faults of detail, not of principle, and will be rapidly corrected now that its use is extending greatly and competition in its manufacture is increasing. On the whole, it is safe to assume that there will be comparatively very little dissent from the specifications that we laid down in the earlier article on this subject as to the proper requirements of the law concerning the brakes and couplers to be used.

Nor is it likely that the law could go further in this direction than we indicated in that article. If these fundamental requirements are made, the companies which are compelled to get automatic brakes and couplers will get good ones of their kinds. If they do not do so from self-interest they can hardly be made to do so by officers of the law.

We cannot pretend that the most difficult part of the question, the limits of time within which equipment with safety appliances should be begun or completed, or the rate at which it should proceed, is much nearer settlement now than when we last wrote on the subject. Of those who have answered the circular, at least one-third are decidedly of the opinion that legislation is not needed, or that such control of the affairs of the railroads is no proper part of the duty of our government; but most of them admit that it is impending. No doubt many of those who have not discussed this part of the subject think in the same way, but refrain from discussion as useless. About 35 per cent. of them think that if equipment with safety appliances is to be compulsory it should be begun at once. Others think that it should be begun within six months of the enactment of the law, others that it should be begun within 18 months, and others suggest Jan. 1, 1891. The suggestion is also made that no time should be fixed for beginning equipment, but merely a date set for its completion. About one-half of the replies are that all new rolling stock should be equipped as built, and that all cars going into the shops for general repairs should be provided with the automatic brakes and couplers. Others suggest that from five per cent. to 20 per cent. of the old stock should be equipped yearly. A suggestion which is o

much weight is from the Chicago, Burlington & Quincy. It is as follows:

"First—We are of the opinion that compulsory equipment with air brakes for the present should be confined to engines. There is no use putting them on cars if they are not to be used, and they cannot be used unless the engines throughout the country are equipped with apparatus to use them. We are of the opinion that new equipment alone should be fitted with automatic couplers. Both should be done at once. Second—We think that all engines, as they pass through the shops for general or light repairs, should be fitted with air brakes, both to their drivers and tenders; also that all new freight equipment or rebuilt freight cars should have automatic couplers. A law of this kind will probably be all that the manufacturers can at present carry out, unless they resort to the manufacture of some cheap and inferior product, which would result in destroying the very object sought after—viz., the safety of trainmen."

It is obvious that the time of beginning equipment must be placed so far away that the makers can prepare for the great increase of work, and that the railroads also may make necessary arrangements for the work to be done in their own shops. Perhaps six months after the enactment of the law will be time enough to allow for these purposes. The law could then provide that at the end of six months from its passage all new locomotives, and all locomotives that go into the shops for repairs should be equipped with the air-brake apparatus, with a power driven brake and with air brakes on the tenders. Within a year a very large part of the locomotives of the United States would be equipped, and within two years nearly all of them, and the apparatus would be operative and useful on each engine from the moment it was put on.

By the end of six months after the equipment of engines begins there will be so many in service with the air-brake apparatus on that air brakes on freight cars can be put into considerable use; therefore, as a reasonable compromise between those who would begin the compulsory equipment of cars at once and those who would postpone it until all engines are equipped, we suggest that the law provide that one year from its enactment the equipment of freight cars with air brakes and automatic couplers must begin, and that these must be applied to all new cars, to all cars rebuilt, and to all which go in for general repairs. Of course, "general repairs" must be carefully defined, and, of course, we speak only of those cars over which Congress can exercise jurisdiction. As we have said before, it is certain that the action of Congress will be closely followed by the states; therefore, all cars would soon be included in the law. It is quite true that until engines and a considerable number of cars are equipped the air-brakes that may be applied to a few cars will be unused and will go to destruction for want of use. But a beginning must be made. Cars can be equipped but gradually at best. There is a physical limit to the amount of brake and coupler material that can be turned out in a year; therefore the companies will have to arrange to get their air-braked cars, as rapidly as possible into trains where the brakes can be used, and accept some waste of interest money and in depreciation of unused apparatus at the commencement. After equipment fairly begins the roads will be under constant stress to increase it as fast as they can in order to get the worth of investments already made. The more cars they equip with the improved apparatus the greater will be its value on any one car. Considering these facts, and the enormous outlay involved, and the necessary limit to the numbers of the makers and the amount of material that they can turn out it will not be wise to force the equipment of cars faster than has been indicated above. Even supposing that brakes and couplers are applied only to new cars and to those undergoing considerable repairs, the demand for such material will be far beyond the capacity of existing shops; and if the shops can supply the material the freight stock of the country will be entirely equipped in probably about eight years. But as we have seen, if this change is once largely begun, it will proceed rapidly for economical reasons on all roads that can find the means to be economical.

To recapitulate, we should say that having specified the safety appliances to be used, a workable law might specify the time of beginning to put them on and the minimum rate at which their introduction must proceed as follows:

Engines: equipment to begin six months after the enactment of the law, and to include after that all new locomotives and all going into the shops for repairs.

Freight cars: equipment to begin one year after the enactment of the law, and to include all new cars, all cars rebuilt, and all that undergo general repairs.

Finally, we repeat that if the law is to be useful it must be reasonable and practicable from the operating officers' standpoint, and we suggest that the committee that has the bill in charge take steps to get the opinions of some of the officers of the leading roads, as well as those of experts in brakes and couplers; and that they ascertain also the capacity of the works to supply the material. It has been suggested to us that this committee should ask the General Time Convention to name 25 to 50 officers who might be called on to give information. The suggestion is an excellent one. It indicates one way of getting the opinions of men whose opinions are of real value, and whose co-operation is essential to the success of the law.

Voting Trusts.

The Atchison voting trust seems to be one of those rare cases where two wrongs make a right. A trust, in this sense of the word, is an arrangement by which the stockholders part with their voting power for a term of years, and during that time lose all control over the management. The object of such a scheme is to protect each individual investor from the effect of changes of policy which might arise if a majority interest in the stock should change hands. In an ordinary corporation this is an ever present liability. But if the stock, or a majority of such stock, is placed in the hands of trustees, who give in return a set of trust receipts entitling the holder to all dividends on his stock, the investment and the management become separated. If the trust receipts change hands the dividends go to the new holder; the management remains where it was before, namely, under the control of the trustees.

Such is the recognized character and purpose of voting trusts. Their object is to secure permanence of management without sacrificing transferability of shares. The particular form of trust which arouses so much discussion to-day is simply an effort to apply this means to effect a virtual combination between different concerns by putting their stock in the hands of the same trustees. The legal objections to trusts in this sense do not apply to the plan proposed by the Atchison. Trusts in the modern form are a means to an end; it is the end rather than means to which the courts take chief exception.

Yet the law does not on the whole look with any great favor on the means itself. The courts do not like to make a man trustee in his own behalf even in an indirect fashion. The opposition to a proceeding of this kind is usually based on legal technicalities. But it really has wider and stronger economic ground. If a concern is owned and managed by its stockholders, the power and responsibility belong in the same hands. If some of the existing owners secure permanent tenure of management by means of a trust, and then sell their interest as investors to others, power and responsibility are at once separated. If a man wishes to make himself trustee in his own behalf, there is often a presumption that he wishes to retain the power and avoid the responsibility, and that his motives in so doing are questionable. Looked at from the standpoint of the community, the gain in stability of management is more than offset by the loss of safeguards against mismanagement. From this point of view a voting trust is wrong in principle.

But, as we indicated at the outset, there are complications in a large system like the Atchison which may put a different face on the whole matter. If all the capital for a railroad had been furnished by the stockholders, there would be no sufficient excuse for asking them to resign their power of control. But where a large part of the money invested has been furnished by bondholders, the case is different. Management and investment have already become practically separated. To place the voting power in the hands of trustees may have the effect of giving more influence to the real investors rather than less.

Take the case of the Atchison as it stands. The nominal amount of the stock is $75,000,000. At present prices this amounts to about $25,000,000 in value. The other interests in the system are worth, on the same basis of valuation, at least $150,000,000. The stock thus represents about one-seventh of the total valuation. A majority of the stock has power to control the operations of the whole. A property worth something like $175,000,000 is thus under the power of an interest commercially worth $13,000,000. This is very far from being management of the property by the investors. Of course, it would cost a ring much more than $13,000,000 to secure control, but the case offers a considerable chance for schemers who have other than legitimate ends in view, and affords most of the real investors comparatively little protection.

Under these circumstances the trust seems to afford the best and simplest means of giving the bondholders an assurance that the road will be run in their interest. Instead of offering chances for dishonest manipulation, it goes far to remove them. Instead of separating power and responsibility, it may really tend to unite them. If the result proves good it is not unlikely to furnish a precedent for subsequent reorganizations.

Had our railroads been built with stock instead of bonds the question would not have come up in its present form. Had the stockholders furnished three-quarters of the capital, as is the case in England, it is doubtful whether a railroad trust of this kind could be justified on grounds of public policy. If investment and management were actually in the same hands, there would be no good excuse for separating them. But they are not in the same hands. They are already separated by the existence of the large investment in the form of bonds, whose owners have no direct voice in the management. This being the case, a necessary step in putting the control where it belongs may lie in taking it out of the hands of the stockholders. This is what we mean by saying that two wrongs make a right. It is wrong, as a general principle, to build railroads with bonds instead of stock. It is also wrong, as a general principle, to deprive stockholders of the control of their property. But where the bondholders and not the stockholders are the real owners of most of what the property is worth, the second wrong may rectify the first. It may result in putting the control where it belongs and securing legitimate rights, without the expense of foreclosure or the dangers of complete reorganization.

English Legislation for Safety.

The compulsory adoption of block signaling and interlocking, and of automatic train brakes for passenger trains, is now an assured thing in Great Britain. The terrible collision on the Great North of Ireland last June drew the attention of Parliament and the public sharply to the general question of safety appliances for train working, and it appears that the President of the Board of Trade had no difficulty in securing the passage of an act giving the Board ample mandatory powers. The disaster in Ireland was, indeed, primarily due to the simple lack of hand brakes on the cars, a lack which is wholly inexcusable, regardless of the question of continuous brakes, either automatic or non-automatic: but the remarkable record of security to life and property which the principal British roads have shown during the past ten or fifteen years makes public opinion very sensitive, and an appalling disaster like that at Armagh at once puts the people in a temper which takes little note of details or fine distinctions. The powers granted, therefore, are substantially just what the Board asked for. If it had demanded even more it apparently would have had no difficulty in securing acquiescence.

Mr. Courtenay Boyle, on behalf of the Railway Department of the Board of Trade, notified all the railroad companies on Oct. 24 that the block system must be fully introduced within one year, the interlocking of switches and signals within 18 months, and the application of automatic brakes, complying with the present requirements of the Board of Trade, on all trains carrying passengers within 18 months. The circular does not prescribe any particulars in connection with the block system, and apparently permissive blocking will not be absolutely prohibited. As is well known, the block system is in use on over 90 per cent. of the mileage of the existing roads in England and on about 60 per cent. of the mileage in Ireland. The reports of the companies to the Board of Trade indicate that most of this mileage is operated under the absolute block system, but outside observers who seem well informed are authority for the statement that there is much permissive blocking where nominally it is not allowed. On single-track roads the Board will allow the staff system, if used without tickets, and accept such working in lieu of a regular block system.

The requirements of the Board of Trade in the matter of interlocking are rigid. The aim of the inspectors of the board in applying a standard to specific cases is apparently to provide every possible safeguard, and their decisions often require a duplication of signals for the purpose of providing against the most remote contingencies. Mr. Boyle's letter states, however, that on single-track roads the switches leading to side tracks located between block or staff stations will not be required to be connected with the station if they are locked with the Annetts key. By this system the switch can only be unlocked by a key which is fastened to or is a part of the train staff, and the staff is locked into the switch so long as the latter is off the main track.

The requirement of automatic brakes on all trains carrying passengers seems to completely prohibit mixed trains, as the expressions of the Board heretofore have indicated that the running of freight cars behind passenger cars will not be approved. The combined requirements, while not a very serious matter for the larger roads, except, perhaps, in the matter of brakes, will constitute a somewhat onerous burden on the Irish lines with their thin traffic. But the diminution in the number of accidents and in the sums paid out for damages on the large English roads since they adopted the safeguards now prescribed affords such overwhelming evidence of the financial wisdom of the expenditure that there can be no question of the ultimate justice of the present law. The strain is felt chiefly in the courage required to make a large investment on which the return is wholly in the future.

The Discomforts of Sleeping Cars.

A certain theatrical company has popularized the notion that a ride in a sleeping car is nothing but fun. In the play to which we refer the people occupying the palace car either find all their experiences pleasant ones, or else readily devise means of rising above the annoyances of life on the rail, and everything comes out happily. But in real life matters do not run so smoothly and travelers continually complain of the unnecessary woes of a trip in a sleeping car. Crotchety old men, and others who are neither old nor crotchety, bump their heads against the upper berth while dressing, and appeal to state legislatures for redress. People whose conduct is entirely civil and unselfish are jostled in the wash room by big fellows with spreading elbows, and demand more numerous wash bowls. The multitudinous duties of the porter are often shabbily performed, and there are consequent complaints of lack of towels, delay in making up berths, or of inattention generally.

Beyond all these troubles, which a philosophical mind can endure if it be absolutely necessary, is the standing criticism concerning the almost entire lack of privacy in the ordinary American sleeping car. Women do not ride in sleeping cars so much as they would if they could have congenial surroundings. They do not complain very loudly themselves, but their faithful defenders, the opposite sex, frequently present the matter and demand a reform. The public is not the only sufferer, as the disinclination of women to patronize sleeping cars deprives the car owner of possible revenue. The subject has been pressed with more than ordinary persistency of late, the following paragraph being a sample of communications found in various prominent newspapers:

A feature of the sleeping-car service which should receive careful and prompt consideration is that which precludes the possibility of a lady traveling alone having any privacy in a sleeping car. The companies refuse to sell a person a whole section unless he or she buys two tickets, which of course makes it out of the question for most people traveling alone. As it is now, a lady may be compelled to occupy a lower berth, while the upper berth may be occupied by a man whose presence would be exceedingly disagreeable under any circumstances; and if she is unfortunately compelled to take the upper berth, the situation is not made any more agreeable, and in many respects made much worse. Is it not a possible thing for managers of railroads to set apart, say, two or more sections in one end of the car, which would be devoted exclusively to the use of ladies, thus insuring them absolute privacy and the ability to purchase a single berth? This plan could also be utilized to advantage by families traveling together, and I feel quite sure that the palace car people would be glad to make an arrangement of that kind. The only reason why it has not been done before is, perhaps, because the matter has not been called to their attention.

The demand, then, is for larger wash rooms, separate apartments for ladies and families, and good attendance—in fact, a hotel. Why cannot this demand be met?

Practically, this is entirely a matter of cost or economy. The question of affording suitable accommodations for people who travel divides itself into a number of degrees. The millionaire, the popular actress, the railroad president, and even the tenth vice-president, or other officer of low degree, have private cars. They can have the upper berth up or down, they can wash themselves without holding on to the hand rail, and can turn around without knocking over a neighbor. Next in order is the compartment car, first successfully introduced in this country for regular use by the Mann Company. Here we have comparative privacy, and in a number of cars lately built there are four to six lavatories and closets in each car, so that the most fastidious passenger can have little left to ask for. But this, although more economical than the special car, is still much more costly than the ordinary sleeper. The average space per passenger is great and the capacity of a car small. Next is the regular sleeping car, in which the capacity is generally about 30 passengers, one to each berth, though the average number of berths actually occupied is probably not over 15 or 20. A shade below this is the tourist sleeper, in which pace is still used somewhat lavishly, but where money is saved by the elimination of luxuries. For day travel we have the drawing-room car, in which the number of seats is limited sufficiently to insure a moderate amount of fresh air for each passenger, and beyond this the ordinary passenger car, where space is economically used and we get the most favorable conditions; but we here meet the counter difficulty of a lack of air and ventilation and a superabundance of dust.

Railroads do not give to every passenger all he wants in the directions indicated simply because it does not pay. The plan of the correspondent quoted is not practicable. Certainly he would not recommend the reservation of less than two sections of a sleeper for female passengers; but to set apart even this small space would often result in their going empty for the whole trip. The proportion of women traveling fluctuates widely, and, moreover, a large share of them are accompanied by their husbands, or there is a family party, thus making separation impracticable. The sleeping-car companies do place ladies nearest the end of the car containing their toilet room, as far as it is practicable to do so; but this, after all, covers only one element of the desired privacy. The passing of passengers and trainmen through the train, which the former demand the right to do and the latter must do in the line of their duties, cannot be overcome.

On many sleeping-car routes it barely pays to run a single car. A new road, on opening for business, puts on a sleeping-car line to attract passengers. Competitors have to do the same, and neither one makes money out of it. Older lines between important cities may do a paying business, although it is a question whether the profits of the sleeping-car companies are not offset in a material degree by the losses of the railroad companies hauling the cars. On the heavy lines of the New York Central two trains out of New York City have each a compartment sleeping car, and to this extent the demand we are considering is met: but a room to one's self is still expensive; and of the seven trains daily on which sleeping cars are run, the other five have only the ordinary style. The Pullman Company now controls the compartment cars formerly run by Mann, and the Wagner Company has built a number of cars embodying the same principle (of separate rooms for privacy), so that there is now no obstacle to prevent progress if there is a definite demand for it. It is costly for a single passenger to monopolize a whole section, any way you look at it. Even if the sleeping-car company be willing to grant the extra space, or to afford it at moderate rates, the railroad company hauling the car should object, for the transportation of one to two tons of dead weight for each passenger cannot be regarded as other than a luxury.

But the exigencies of competition have in the past led railroads to give many kinds of luxury for a very inadequate return, and it is probable that this tendency may continue, so that it is by no means certain that those who deem themselves entitled to a larger share of floor space in traveling are destined to be always unsatisfied. A few of the luxurious trains now running afford separate sleeping compartments, separate lavatories, bath rooms and other conveniences which a few years ago were regarded as entirely out of the question. It is true that the passenger has to pay well for these improvements; but, as we have just intimated there are constantly at work tendencies which compel railroads to forego most or all of their profit on this class of business, and when they give passengers these luxuries at cost or below, the price will of course be brought within the means of an increasing number of people.

On the Chicago, St. Paul & Kansas City, which has run Mann boudoir sleeping cars since its opening, the Chicago-St. Paul trains have, in the busy season, one boudoir and one standard Pullman sleeper, the two being offered to passengers on equal terms, and under these conditions 75 per cent. of the people prefer the Mann car. A large proportion of the other 25 per cent. are inexperienced travelers. In the winter months, when one car only can be run, that one is the boudoir, though the company seems to be free to choose either. This run is made almost wholly in the night, however, and the objection offered by many people, that a compartment car affords, in the day time, too much seclusion, does not enter into the question. This case gives evidence of growing appreciation of compartment sleeping cars, and possibly shows that tastes vary in different parts of the country. There still remains to be met the feeling of some people—possibly it is a whim that ought to be killed out—that it is all right to sleep in a room with a dozen strange room-mates, but intolerable to share an apartment with *one* stranger. The "boudoirs" have two berths each, an upper and a lower; and it must be assumed that the Chicago, St. Paul & Kansas City has had the good fortune to find a large share of its passengers assorted into congenial pairs.

In the matter of good attendance the companies are, it seems to us, simply standing in their own light. It is reasonable to suppose that the sleeping-car company which shall employ a high grade of men, the superintendent seeing that each conductor is alert, well informed and possessed of a reasonable share of the moral qualities necessary in dealing with gentlemen and ladies, and that each porter has an intelligent and industrious interest in his work, will, if it pursues this policy consistently, surely draw the best part of the custom.

Results Under the "Zone Tariff."

The official organ of the Hungarian State Railroads, the *Vasuti es Kozlekedesi Kozlony*, has published a statement of the number of passengers carried and the passenger earnings of the Hungarian railroads during August, the first month of the "zone" passenger tariff. On the state railroads there were:

	1889.	1888.	Increase.	Pc.
No. passengers	972,404	654,532	317,872	48.6
Earnings (florins)	955,811	893,603	62,208	6.9

The earnings include those for carrying baggage, which must have increased largely, none being carried free under the new tariff. On the Hungarian Northeastern the gains were greater, as follows:

	1889.	1888.	Increase.	Pc.
Passengers carried	160,950	75,340	85,620	113.7
Florins earned	112,349	95,726	16,623	17.3

On the Kaschau & Oderberg line, on which the zone tariff was applied to a part only of the traffic, the result was:

	1889.	1888.	Inc. or Dec.	Pc.
Passengers carried	89,418	63,001	I. 26,417	42.0
Florins earned	59,624	66,342	D. 6,718	10.1

The traffic on this road thus increased nearly as much as on the State Railroads, but the earnings decreased instead of increasing.

The Austro-Hungarian State Railroad Company (a private corporation which bought many years ago a system then owned by the Austrian government) did not introduce the zone tariff, but on the part of its system which is in Hungary made material reductions in its rates, so as to be able to compete with the Hungarian State Railroad, so that for the longer distances it rates were as low as those of the zone tariff. It had an increase of 36,129 (about 12½ per cent.) in passengers carried, but a decrease of 10,757 florins (3.7 per cent.) in passenger earnings. The Austrian Southern Railroad, part of whose system is in Hungary, made no change whatever in rates, and gained 7,257 in number of passengers carried and 9,573 florins in passenger earnings.

A later issue of the same periodical gives a statement of the passenger traffic of the State Railroads for the first three months of the zone tariff (August, September and October), compared with the corresponding months last year, as follows:

	'889.	1888.	Increase.	P.c.
No. pass. tickets sold	3,324,239	1,276,118	2,048,121	160.0
Pass. earnings (florins)	3,027,110	2,569,069	458,041	18.0
Pieces baggage forwarded	196,756	144,490	52,266	36.0
Earnings from baggage	166,908	93,683	73,225	78.0

Thus the great increase in passenger traffic shown in August has continued, and the increase in earnings is considerable. The abolition of a free allowance of baggage has greatly increased the earnings from this source, and the earnings from passengers and baggage together were 20 per cent. greater this year than last—very probably enough to cover the increased cost of the larger traffic, which would be a very favorable result. It seems that only one passenger in 17 has any baggage to put into the baggage car under the new plan, by which it must all be paid for, while one in nine had such baggage by the old plan, which allowed each passenger 55 lbs. free.

Considerably more than half of the passengers this year (62 per cent.) went no further than to the second station from their starting place. It will be remembered that besides the strictly "zone tariff," tickets are issued to the first and to the second stations from the point of starting at extremely low rates.

The block system is to be put in use on about 22 miles of the "Big Four" between Cincinnati, O., and Lawrenceburg Junction, Ind. There are 10 block sections, the shortest being 1.1 miles long and the longest 3.1. The rules are similar to those in force on the Michigan Central, Wabash and other single track roads, but the semaphore is never to be lowered by a station operator except by direction of the train dispatcher. Operators will, however, in case of failure of the wire, let trains follow under a caution signal after 10 minutes.

Mr. Carlton Hillyer, Auditor of the Georgia Railroad, in an article in the *Station Agent*, describing his method of making up a daily statement of earnings and expenses for the whole road, states that the agents on that road are required to make a cash deposit sufficient to cover the average amount of their daily balances. The company allows interest on these deposits, and invests the principal in the company's bonds. The plan has been in operation for a number of years, and is regarded as a good substitute for bondsmen.

The locomotive engineers of the New York, Lake Erie & Western have been giving the reporters material for a great amount of gossip the past week, the basis of it being, apparently, the suspension of four runners who had been on a grievance committee. It has been stated

that their membership on this committee was the cause of their suspension, but no authentic information is given out. On Monday a conference between officers of the road and representatives of the engineers was held in New York, and the four men were reinstated. Both sides then said that everything had been settled amicably.

A new railroad in Spain, extending from Huelfa to Zafra, 175 kilometres (109 miles), has recently adopted something similar to the Hungarian zone system for its passenger business. The comparatively short line, however, is divided into 12 zones, so that the increase from zone to zone is about a good station distance. The rates for the whole length of the road are $2.32, $1.74 and $1.16 for the three classes, respectively. The average rates per mile, which used to be 6.51 cents, 2.48 and 1.85 cents, respectively, are reduced to 1.86, 1.40 and .63 cents for the three classes. The same company not long ago reduced its freight rates one-half from those authorized by law.

A Philadelphia paper has been timing trains at the Broad street station in that city, and prints a record of delays, indicating that the capacity of that station is now taxed pretty nearly to its limit. On Dec. 12 seventeen trains timed to depart between 6 and 7:30 in the evening actually started from three to eight minutes behind time. The passengers were loaded and the gates shut on time, but the engineer had to wait for his clear signal. A similar table is published of inward trains in the morning. With these the delays are shorter, averaging about three minutes; but it is not stated whether or not the trains left the previous station on time. This is about the state of affairs at the Grand Central station in New York City, referred to in our last issue. It appears that New York is not alone in her troubles. The yardmaster, doubtless, delays outward trains more than inward, intentionally. Where switching movements are constantly pressing, such a thing as a time clearance before the departure of regular trains is out of the question. By proper adjustment of schedules the lost time can be made up within a few miles, but those passengers who finish their journey before these few miles are traversed are constantly irritated, and all the regular passengers constantly ask themselves (and frequently ask the railroad company) why, if five minutes *must* be allowed, they cannot be allowed to spend it at their stores and offices. To use yard tracks constantly to their full capacity it is necessary to make trains wait more or less in order that slight irregularities shall not result in making the tracks wait for the trains; but as the comfort of passengers and the safety of the yard employés are both promoted by providing enough tracks to allow some margin of time for delays, it is clearly for the interest of railroad companies to make such provision. When switching operations delay inward trains the lost time can be made up only by the individual passengers, so that to satisfy them it is absolutely necessary to make switching engines clear the time of these trains a minute or two. If there is no clearance at all, little unavoidable delays cause annoying stops. Telling the passengers that they pay a very low rate of fare does not make a very effective argument.

NEW PUBLICATIONS.

Municipal Engineering. A Study of Street Pavements. By Lewis M. Haupt.

This pamphlet consists of a lecture delivered by Professor Haupt before the Franklin Institute, Nov. 8, 1889. It discusses some of the defects of American street pavements and suggests remedies.

Proceedings of the Twentieth Annual Convention of the Master Car and Locomotive Painters' Association.

This is a report of the convention held last September, which was extensively reported in the *Railroad Gazette* at the time. The discussions are here given in full. The Secretary is Mr. Robert McKeon, Kent, O.

Tenth Annual Report of the Ohio Society of Surveyors and Civil Engineers.

This is a report of the transactions of the society at its meeting held in Columbus, O., January, 1889. It contains papers, reports and discussions on a variety of subjects of more or less professional interest. Copies may be had from the Secretary, C. N. Brown, Columbus, O.; price 50 cents.

Sanitary Condition of Watch Hill, R. I. By W. Paul Gerhard, C. E.

This is a report by Mr. Gerhard to the President of the Watch Hill Improvement Association. It describes the present condition of that watering place, which is entirely without a system of sewerage or public water supply, and proposes a method of sewerage. Suggestions are made also as to the interior sanitary arrangements of the hotels and cottages.

The *Station Agent*, which is now in its second volume, issues a holiday number of 65 pages, containing a large variety of interesting reading matter, much of which is original. It opens with a poem by the editor, and has portraits of a number of station agents. There are original articles on Accounting, the Brotherhood of Locomotive Engineers, the Origin and Growth of Fast Freight Lines, on the development of our ticket system, and on the Midland Railway of England. The article on the Midland is by E. M. Needham, superintendent of that road, and that on fast freight lines is by W. W. Chandler, General Agent of the Star Union Line at Chicago, who has been in his present position 25 years. The *Station Agent* is published monthly at Cleveland, O.

American Railroad Bridges. By Theodore Cooper. Engineering News Publishing Co., New York.

This is a paper presented by Mr. Cooper at the Seabright convention of the American Society of Civil Engineers last summer. We gave extensive extracts from it in our issue of June 28, and the paper has been published in the Transactions of the society. It is a very valuable monograph, and contains much information never before collected; for instance, that as to the length of railroad bridges of different classes in use in the United States. About one-third of the paper is devoted to a brief history of American bridges. This is followed by an account of the modern American system of computation of strains and of the development of methods of obtaining knowledge of the strength of materials in American practice. The work is profusely illustrated by direct reproductions from photographs and by folding sheets and diagrams. In an appendix is given an abstract of recent tests of full-sized bridge timbers.

Paris Universal Exposition of 1889. By E. T. Jeffrey.

This is a report made by Mr. E. T. Jeffrey, lately General Manager Illinois Central Railroad, to the Citizens' Executive Committee of Chicago. Mr. Jeffrey was suddenly called upon last September by the Chicago World's Fair Committee to go to Paris and report to them on the Exposition, then in progress. He arrived in Paris Oct. 13, and at once set to work with the aid of Mr. Octave Chanute, who accompanied him. His official report is a volume of 72 pages, with six folding plates, showing the arrangement of the buildings and grounds. It is a succinct and clear explanation of the history, finances, organization and conduct of the most successful exhibition ever held, with some suggestions as to the lessons of this exhibition for the Chicago Committee.

A brief sketch is given of the very clever financial scheme by which 30,000,000 admission tickets were sold and $9,300,000 in cash was available before the Exposition was opened. The cost of the buildings and of the preparation of the site Mr. Jeffrey does not attempt to give, but he estimates the three main structures on the Champ de Mars at $3,957,719. An estimate by Mr. Guichard, made a year ago, was $5,886,432. These do not of course include the Palace of the Trocadero, which was built in 1877-8 at a cost of $2,500,000, the Palace of Industry, which cost $1,100,000 in 1855, and other buildings used for the purposes of this Exposition.

The means of transportation to the Exposition and through the grounds are briefly touched upon and described as entirely inadequate. The carrying capacity of the various public conveyances was estimated at 175,000 per day; but the difficulty and delay in getting away at nightfall were very great, while the "transportation of visitors *within* an exposition is still an unsolved problem." The total admissions were 32,354,111, and the greatest number on any one day 387,877.

The total available income of the Exposition was $11,069,562, so far as is now known, and it is believed that there will be from $1,600,000 to $1,800,000 of Exposition funds in the National Treasury when the accounts are all settled. It is estimated by competent judges that the Exposition added $12,000,000 to the earnings of the French railroads, while the financial benefits to tradespeople and others of the city of Paris "were far beyond the most sanguine expectations."

TRADE CATALOGUES.

Catalogue of Steam Shovels and Wrecking Cars Manufactured by the Bucyrus Foundry and Manufacturing Co., Bucyrus, O.

This catalogue contains illustrations of some of the steam shovels and wrecking cars made by this company. In the past seven years the company has built over 75 steam shovels and a large number of wrecking cars. Four principal sizes are built, viz., engines 10 in. × 14 in., dipper 2½ yds.; engines 8 in. × 12 in., dipper 1¾ yds.; engines 8 in. × 10 in., dipper 1¼ yds.; engines 6 in. × 8 in., dipper ¾ yd. The company has now in preparation a smaller, semi-portable shovel with 5 in. × 8 in. engines and ⅛ yd. dipper. This will be particularly light and portable, and so made that it can be easily taken down and re-erected. Among the illustrations is one of a No. 1 shovel working in a cut 100 ft. high, in which the shovel was buried three times by the caving in of the bank; the machine sustaining no serious injury. Another is of a steam shovel working on the Illinois Central, which loaded 301 cars of 8 yds. each in 10 hours, including 1½ hours waiting for cars.

Creosote Lumber and Construction Co., Fernandina, Fla. —This is a little pamphlet describing the works of the company and the processes used, which have already been made known to the readers of the *Railroad Gazette* in an article published Nov. 16, 1888. Some information as to the methods and results of creosoting has been added, collected chiefly from sources now well known.

TECHNICAL.

Locomotive Building.

The Shenandoah Valley has had five freight engines built at the Rogers Locomotive Works in Paterson, N. J.

The Manchester Locomotive Works have just completed a very heavy 10-wheel locomotive and shipped it to Fort Payne, Ala.

At the shops of the Delaware & Hudson Canal Co. there has been built this year three mogul locomotives, one passenger and one inspectors' locomotives.

The Pennsylvania has, it is stated, given a large order for 55 engines, to the Baldwin Locomotive Works. This is in addition to the order for 20 given some time ago and now completed.

The Old Colony has just finished at its South Boston shops another standard 18x24 passenger engine, and another locomotive of the same pattern is now being built.

Car Notes.

Pardee, Snyder & Co., of Watsontown, Pa., are building 250 34 ft. eight-wheel box cars, of 25 tons capacity for the Central of New Jersey. The cars are fitted with Westinghouse air brakes and the Gould coupler.

The Lehigh Valley has built 3,173 cars at its own shops the past year. Of this number 68 were built for passenger service, 2,726 for freight service, 362 to replace cars worn out in freight service, 80 for service cars in the roadway department and five cars to replace service cars worn out.

The Chicago, Burlington & Quincy has built 22 engines 87 freight cars and three mail cars at the shops of the road during the past year.

The New York, Pennsylvania & Ohio has received 100 new box cars, which were placed in service this week.

The Delaware & Hudson Canal Co. has put in service the past year on its Northern Division the following cars built at its shops: 12 passenger, 400 eight-wheel box and 200 eight-wheel hopper gondola cars.

Two hundred and eight freight cars, four caboose, two express and three passenger cars have been built during the year by the Wilmington & Weldon.

The Wabash has in service eight engines built at its shops the past year. Three of the locomotives are 10-wheel 18 × 24 freight, and four are eight-wheel 17 × 24 freight. One is a 17 × 24 four-wheel switching engine with trailing wheels.

The Grand Trunk last year built 1,235 freight cars and 75 passenger cars. Eleven of the passenger and 1,125 of the freight cars were to replace old ones, so that the actual addition to the equipment amounts to 110 freight cars and four passenger cars. Twenty-six engines have been built during the year.

The New York, Providence & Boston has just put a new dining car in service between Boston and New York on the evening train. The car is named the Thames, and has eight tables, accommodating 32 persons at one time. The Pintsch gas light is used.

Last week the South Baltimore Car Works turned out 72 freight cars, averaging 12 a day.

The Nashville, Chattanooga & St. Louis has recently received a number of the fine passenger coaches built by the Pullman Co. which have smoking compartments and toilet rooms at one end and a toilet room at the other end.

The Kansas City, Memphis & Birmingham has just received eight new passenger coaches from the Pullman Palace Car Co. Four of the cars are first-class and four second-class. The cars are fitted with the Frost dry carburetter light, which this road has adopted.

The Nova Scotia Central road last week received another lot of eight passenger cars from the Jackson & Sharp Co., of Wilmington, Del. The cars are fitted for continuous steam heating,

The Jackson & Sharp Co, of Wilmington, Del., has delivered the following equipment since Jan. 1 last: 100 passenger cars, 46 combination cars, 19 baggage, mail and express cars, 22 sleeping cars, three parlor cars, three private cars, 95 freight cars, 15 excursion cars, five milk and three United States postal cars. The total of all kinds is 311.

The Cleveland, Cincinnati, Chicago & St. Louis has given an order to the Barney Smith Co. to repaint 310 passenger coaches, baggage and express cars orange color, to correspond with the new standard color on that road. A number of the cars will be vestibuled.

The Central of Georgia has ordered 250 sets of trucks of the Ohio Falls Car Co.

Bridge Notes.

Collins & Appleby have just completed five bridges on the St. Martins & Upham road in New Brunswick. Four are Howe truss bridges. Another bridge is being built by the firm, which will not be completed until spring.

The new steel bridge on the New Brunswick road at Stickney's has been completed. It is a steel plate girder, built by the Dominion Bridge Works, of Montreal, and is 44 ft. long. A Howe truss bridge, 103 ft. long, at Monquart, near Bath station, has also been finished.

The iron bridge on the Nashville & Knoxville road, across the Caney Fork River, at Buffalo Valley, Tenn., is now nearing completion. It is being built by the Penn Bridge Co.

The committee appointed by the town of Warren, R. I., for the purpose of building a bridge over Warren River, at North Main street, are prepared to receive bids until Jan. 25 for an iron drawbridge and substructure. Daniel L. Turner, Warren, R. I., is secretary of the committee.

The Elizabeth City County will issue bonds to build an iron bridge about 650 ft. long, near Hampton, Va.

The Chicago, Rock Island & Pacific has completed a new iron bridge 800 ft. long over the Arkansas River at Dodge City, Kan.

One span of the new bridge over the river at Market street, Williamsport, Pa., which had not been fully fastened in position, fell last week when a heavy load of lumber was driven upon it.

Some time ago the Edge Moore Bridge Works filed suit against the St. Louis, Arkansas & Texas, in the United States Supreme Court, to secure $24,000 balance due them for building a bridge across the Arkansas river at Rob Roy, Ark. Last week the defendants paid the $24,000 and the case was dismissed.

The Schuykill & Lehigh Valley road has commenced the construction of two iron bridges on its new road, one

at Connor, Pa., to be 1,600 ft. long and the other at Germantown, Pa., to be 1,400 ft. long.

Mr. J. H. Beemer, of Montreal, has engineers taking levels, etc., to ascertain the feasibility and cost of a high railroad bridge across the Ottawa River, from opposite Cathcart street, Ottawa, to Hull.

The Pittsburgh & Lake Erie will erect six new iron bridges to take the places of the light ones now in use between Erie and Union City, Pa.

The County Commissioners of Hamilton County, O., will receive proposals until Feb. 1 for a wrought-iron bridge over Mill Creek, above Sharonville, Sycamore Township, to replace a bridge that was burned.

Two new bridges have just been completed over Elm Point Creek and at Dardenne, in St. Charles County, Mo.

Plans have been completed for a railroad bridge across the Arkansas River at Cummins, about midway between Pine Bluff and Arkansas City, Ark. The bridge is to be built by the Kansas City, Arkansas & New Orleans. It is to be 1,200 ft. in length, of four spans and a draw span of 300 ft.

The Keystone Bridge Co. is employing 550 men, and has some very important contracts on hand. It has just shipped a roundhouse for a South American company to be erected at Rio Janeiro. The material is nearly all of Bessemer steel, and was turned out at the Homestead Steel Mill. The company has the contract for the bridge which will be erected over the Missouri River at Kansas City by the Kansas City & Terminal Street Railway Co. It will take 4,000 tons of steel and iron, and all will be rolled in the Union Mill of Carnegie Bros. & Co.

The mild weather has allowed much progress to be made on the three bridges being erected along the Schuylkill River between the Falls and Manayunk, near Philadelphia. The stone work of the bridge for the Baltimore & Ohio's New York trains, at the Falls of Schuylkill, is fast approaching completion. The contractors are Nolan & Bros. Three of the five river piers are above the water level, and the others, if good weather continues, will be as far advanced in a few weeks. Some of the iron work for the superstructure is already on the ground, and will be placed in position as soon as the masonry is finished. Riley Bros. have most of the stone work on the City avenue bridge finished. They had considerable trouble in getting suitable foundations for the two river piers, and a large amount of concrete had to be used for a foundation. This bridge will connect City avenue on the west side of the river with East Fairmount Park. The third bridge is being built by the Philadelphia & Reading at the lower part of Manayunk, and is intended for a branch that will connect with the Reading's main line. The stone work is completed. It consists of an abutment and two piers on the west side of the river, and two piers and an approach on the east side. A. & P. Roberts & Co., of the Pencoyd Iron Works, who have the contract for the iron work, have the plate iron girders for the two western spans in position, and the remainder of their work will be put up as speedily as possible.

Manufacturing and Business.

The Egan Co., of Cincinnati, is building a large four-story addition to its already extensive factory. This new building will front 180 ft. on West Front street and run back 100 ft. on John street to Greenleaf. This will give the company a whole square, bounded by Central avenue, Front street, John and Greenleaf streets.

The Central of New Jersey has given a trial order to to the Dunham Manufacturing Co. for 5,000 Davies spikes 2 in. wide, to be put in track on curves at Hopatcong, N. J.

The Western Fence Co. of Chicago has recently finished building 160 miles of barbed wire fence on the Mason City & Fort Dodge road. This company has fenced all the Chicago, Rock Island & Pacific system during the past two years. The work required nearly 2,500 miles of five wire fence.

The Westinghouse Machine Co. reported that the sales of engines during the month of October, 1889, were the largest in the company's history up to that time, and amounted in the aggregate, junior, standard and compound engines, to 6,035 H. P. The month of November, 1889, however, shows even better results, with sales of 34 junior engines with 940 H. P., 31 standard engines with 940 H. P., and 39 compound engines with 5,300 H. P., a total of 104 engines, aggregating 7,180 H. P.

Iron and Steel.

The furnaces of the Chestnut Hill Iron Ore Co., at Columbia, Pa., which have been idle for three years, are being repaired to be put in blast at once. They are among the largest furnaces in the state.

Work has been commenced on the East Birmingham, Ala., furnace, and it will be pushed at once to completion. It is being built by the Vanderbilt Iron & Steel Co. The Birmingham Lumber Co. has a contract for 400,000 ft. of lumber, to be used in the work.

The Totten & Hogg Iron & Steel Foundry Co., of Pittsburgh, Pa., has an order from the Fort Payne Rolling Mill, Fort Payne, Ala., for a 32-in. steel blooming mill, including two 30 × 48 reversing engines and driving gear. The order also includes a 22-in. nail plate train, a 16-in. bar train with five sets of roll housings, a 9-in. guide train, large ingot shear to cut up to 7× 10 with engine, a small bar shear and engine, and roll and lathe. This company also reports that it has now under way for the Shelby Rolling Mill Co., Helena, Ala., one ordinary size squeezer; also a large size squeezer for the Apollo Iron & Steel Co., of Apollo, Pa.; also rolls, sand and chilled, for various mills; among others 30 × 100 chilled rolls for the Chester Rolling Mills.

McClure & Amsler, of Pittsburgh, Pa., agents for the erection of Massick & Crooke hot-blast stoves, have recently contracted with the Missouri Furnace Co., at South St. Louis, Mo., for the erection of one 17 × 60 ft. Massick & Crooke hot-blast stove. The firm is preparing drawings for remodeling the Bessemer plant of the Hainsworth Steel Co., and is also erecting Massick & Crooke stoves for the Riverside Iron Works at Wheeling, W. Va.; the Paducah Iron & Steel Co., at Paducah, Ky., and the Briar Hill Iron & Coal Co., of Youngstown, O. It also has a contract to erect four stoves, 18 × 65 ft., for the Roanoke Iron & Steel Co., at Roanoke, Va. The Vanderbilt Iron Co., of Birmingham, Ala., has been licensed to erect three Massick & Crooke stoves.

The Rail Market.

Steel Rails.—The market continues quiet, with no large transactions. Quotations are $35 at mill in the East, and $35@$36 cash at Pittsburgh.

Old Rails.—Iron rails are quoted at $26.25@$26.50 at Chicago, and sales have been made at Pittsburgh at $28@$29.

Coal Storage Yard.

Piermont, N. Y., formerly the eastern terminus of the old Erie road, and whose large dock facilities have been little used in recent years, except in the coal traffic, has again been reclaimed by the company. The property is being transposed into an immense coal storage yard at tide water. A Brown hoist and conveying apparatus has been erected for handling coal, and will be used to load boats from the yard. Other extensive improvements are to be made. The yard is now being laid out to hold 275,000 tons of coal.

The Burton Stock Car Co.

The Burton Stock Car Co. is building at its shops at Wichita, Kan., 40 double deck hog and sheep cars for the Chicago, Rock Island & Pacific. The company has recently shipped 20 of its new palace horse cars to various points. The repair shops which the company is building at Forty-ninth and Morgan streets, Chicago, are nearly completed and ready for occupancy. The company is applying the Miller-Hinson (Caswell's) Combination Coupler, illustrated in the *Railroad Gazette*, Dec. 6, 1889, to several cars for trial.

Union Depot Sheds at Grand Rapids.

The Detroit Bridge & Iron Co. has been awarded the contract for the erection of the new Union Depot car sheds at Grand Rapids, Mich. The sheds are to be built of iron and glass, and will be 600 × 134 ft. in size. They will probably be completed by June next.

The Arthur Kill Bridge.

The first train over the new Arthur Kill bridge, at Staten Island, was run from Staten Island to Roselle, N. J., on the Central of New Jersey, on Jan. 1, 1890. It consisted of an engine and one car. The party was made up of several directors and officials of both the Baltimore & Ohio and Staten Island Rapid Transit roads and a few invited guests.

The Bethlehem Iron Works.

Secretary Proctor and Senators Morrill and Allen visited the Bethlehem Iron Works, Dec. 31, to look into the facilities for making guns for the Army. At the works a large force of men is employed in making six and eight inch guns for the Navy, turning out from three to four a week with from eighteen to twenty hoops. The works have facilities for the manufacture and finishing of the most powerful guns and the heaviest shafting and armor plate.

Cars and Engines for the Richmond & Danville.

The Richmond & Danville has had 33 engines built for it during the past year. Of these three were ten-wheel passenger engines built by the Pittsburgh Locomotive Works, and delivered in November; 19 were consolidated engines, 14 were built by the Baldwin Locomotive Works and five by the Pittsburg Locomotive Works. These engines were delivered in June, August, September and December. Eleven mogul engines were built by the Rogers Locomotive Works and delivered in September, October and November.

The company built the following cars at its own shops during the year, two passenger, five express, one officer's, three box, one stock and 16 four-wheel cabooses. Orders were placed with builders for the following cars; 18 passenger cars, 12 built by the Pullman Co. and six by the Jackson & Sharp Co. delivered in June and September. Four combination baggage and passenger cars, built by the Pullman Co., delivered in September; four combination baggage and mail cars, built by the Pullman Co., delivered in October; four express cars, built by the Pullman Co., delivered in September; three postal cars built by the Jackson & Sharp Co., delivered in November; 200 stock cars, 40,000 lbs. capacity, built by the South Baltimore Car Works, delivered in April and July; 880 box cars, 40,000 lbs. capacity, 500 built by the South Baltimore Car Works, 300 by the Tredegar Co., and 20 by the Pullman Co., delivered in June, July and August; 400 box cars, 60,000 lbs capacity, built by the Pullman Co., delivered in August and September; 30 caboose cars, built by the United States Rolling Stock Co., delivered in October; 500 double hopper coal cars, 100 coke cars and 70 platform cars, all of 60,000 lbs. capacity, built by the United States Rolling Stock Co. The 500 double hopper coal cars, 100 coke cars and 70 platform cars were expected to have been delivered in September and October, but only a portion of them have been delivered so far, and probably the whole number will not be delivered until the end of this month. All of the above rolling stock, except that mentioned as being built by the United States Rolling Stock Co., is equipped with Westinghouse air brakes and Janney coupler. The cars built by the United States Rolling Stock Co. have no air brakes, but are equipped with the Thurmond coupler.

Illinois Steel Co.

The *Iron Age* has received by telegraph the following report of the Illinois Steel Co.'s business in 1889: Capital issued, $17,622,600; number of men employed, 9,247; total wages, $4,577,000; value of product, $19,000,000; amount of production in tons: pig metal, 572,095; rails, 461,147; wire, 43,488; merchant bar and nails, 60,230; billets, 50,289; spiegel and ferro-manganese, 18,031; beams and slabs, 4,030. The company consumed 775,000 tons of ore, 575,000 tons of coke, 140,000 tons of coal and 200,000 tons of limestone. The Chicago Furnace Co. made 55,000 tons of pig iron.

Christmas Turkeys.

A train of 20 cars loaded with poultry, and valued at $45,000 left, Smith's Falls, Ontario, Dec. 20, for Boston, arriving there the following day. It went by the Canadian Pacific to St. Polycarpe, and thence by the Canada Atlantic and Central Vermont. The poultry was purchased at the poultry fairs held in Brockville, Smith's Falls, Almonte and other places, and was all brought together at Smith's Falls. To avoid delay at the border, an American customs officer went to Smith's Falls, and there collected the duties, amounting to $4,500. The poultry was not frozen, but sent in refrigerator cars, and arrived as fresh as when killed.

Car Heating Notes.

The apparatus of the Consolidated Car Heating Co. is used on trains of the Atlantic Coast Line, Piedmont Air Line, the Montezuma Special, the vestibule trains of the Pennsylvania, and the transcontinental trains of the Union Pacific. The Pan-American train which has just completed its long trip was equipped with the apparatus of this company. The company reports great activity and is considerably behind its orders.

The Washington Street Tunnel, Chicago.

Work is being rapidly pushed and the contractors, Fitzsimmons, Connell & Co., expect to have the tunnel ready for the cable tracks by March 1.

The Nicaragua Canal.

Work is being pushed on the railroad and telegraph lines between Greytown and Castillo, about 55 miles. The water supply of Greytown, the headquarters, is at present taken from shallow wells, and the canal company is laying pipes to the Indian River to get a supply of pure water.

German Track.

The report that "Goliath" rails were to be adopted for the chief Prussian railroad lines is denied; but it has been decided to increase the number of ties where fast trains are run. At present the ties are spaced 3 ft. from centre to centre, and it is now proposed to diminish this distance to 28 in.

The St. Clair Tunnel.

The tunnel workmen encountered their first difficulty since the work of tunneling commenced last week, when they struck a vein of liquid clay in the heading. For about 36 hours they were kept busy shoveling, without being able to make a foot of headway. The ground over the spot, including a part of the street and considerable space on the common to the west of the tunnel, sank several feet. The trouble was eventually overcome, and the work has been going on since with its accustomed regularity. The tunnel is now over 500 feet from the portal on the Canadian side.

The Grand Prize.

The Brown & Sharpe Manufacturing Co. announce that they have been given an award of the highest class, "The Grand Prize," for their exhibit at the Paris Universal Exposition of 1889.

The machines and tools exhibited were not specially selected or prepared for exhibition, but were the same in finish and design as those they have in stock or approaching completion.

A Compound for the Michigan Central.

The Schenectady Works have recently delivered to the Michigan Central a compound locomotive. The experience with it has as yet been so limited that data are not obtainable. It is said, however, in a general way, that its performance is satisfactory, and it starts quicker than the passenger engines in general use on that road.

Baldwin Locomotive Works.

The Baldwin Locomotive Works built, in 1889, 836 locomotives. The greatest previous output of the works was in 1888, when 737 locomotives were built. The product of the two years in some detail was as follows:

	1889.	1888.
One pair drivers	2	...
Two pairs "	296	188
Three " "	358	277
Four " "	180	272
Totals	836	737

New Webb Compounds.

Mr. F. W. Webb (London & Northwestern) has recently constructed two new express compound passenger locomotives with driving wheels 7 ft. in diameter. These locomotives are doing excellent service, averaging 300 miles per day, with two sets of enginemen.

The Pullman Company.

Pullman's Palace Car Company employs 11,063 hands, who are paid nearly $6,000,000 per year, the average wages being about $50 per month. In the Pullman Loan and Savings Bank there are 1,200 depositors, who are nearly all employés of the Pullman Works. The average amount of the deposit to the credit of each depositor is about $240. This company supplies with sleeping cars 117,854 miles of the 160,000 miles of railroad in this country, and during last year increased the mileage supplied by 11,723 miles. The surplus of the company is officially stated at $15,000,000. The average education of the workmen and the interest taken in literature is improving rapidly under the methods of cultivation offered to the employés by the Pullman Company.

Steam Transfer Table.

The New York Central & Hudson River road has removed the heavy steam transfer table, used in the Grand Central station yard in New York City to shift passenger cars from one track to another, and has substituted a lighter table, which is run by electricity. An addition has been put on the engine-house, in which the dynamo used in furnishing power is located.

Train Lighting in England.

It seems to be a very curious fact that the proper lighting of railway carriages makes much more rapid progress anywhere abroad than it does in this country. We have had no serious burnings as a result of the use of the wretched oil lamps used in most of our railways, but if we had a bad smash on any of the lines at night, these lamps might add to the horrors just as they have elsewhere. Then, perhaps, public opinion might force the railway companies to do something. A fatal accident of this kind last spring has driven the Argentine railway people to improve matters of this kind, and already the following number of coaches have been ordered to be fitted with oil-gas apparatus: Buenos Ayres & Great Southern, 247; Buenos Ayres & Rosario, 198; Central Argentine—Northern—37, and Buenos Ayres & Ensenada Port, 41. Vivi-cremation is a terrible thing, and now that railways are doing so well, surely more light might be put on without waiting for it as an argument.—*The Engineer.*

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulations of Railroads.

In the Federal Court it is ruled that a clause in a railroad construction contract, that makes the engineer's estimate and classification of work final and conclusive, is valid and binding.[1]

In New York the Supreme Court rules that the general creditors of a railroad company cannot complain that a trustee in a mortgage executed by the company to secure its bonds improperly gave a release of errors in a decree adjudicating that the rights of the company have become vested in another corporation, under proceedings to foreclose the mortgages on the company's property, as the trustee represents the mortgage bondholders, and violates no duty to the company by giving the release. Nor are the creditors injured by the fact that the president of the mortgagor company executed a similar release, when it appears that the company was hopelessly insolvent, and that under no circumstances could the general creditors receive anything out of the assets.[2]

In New York the Supreme Court rules that under the statute of 1881, giving railroads a right to take additional lands required by them for railroad purposes, foreign corporations are included.[3]

In Mississippi the Supreme Court holds that a steam railroad cannot be constructed and operated on a street except with the consent of the abutting land owners, or by the right of eminent domain, and it is immaterial whether or not the fee of the street is in the abutting owners.[4]

The Supreme Court of New York decides that under the New York statutes a street railroad cannot, except in New York City, cross the track of a steam railroad without its consent, unless the compensation shall have been previously determined according to law.[5]

In New York, the Supreme Court rules that an agreement by one railroad company that another, "and its assigns," may use one of its tracks on certain conditions, is a mere license, and not a lease; and the licensee cannot enjoy it and at the same time confer the right to do so on other companies, which would be to impose greater burdens on the licensor than the agreement contemplated.[6]

The Mississippi code provides that on payment of a privilege tax a railroad company shall be exempted from all state and county taxes, except taxes on land owned by the company, and not used in operating the road. The Supreme Court decides that a lot on part of which are situated the section house and other improvements is not taxable.[7]

Carriage of Goods and Injuries to Property.

In Tennessee the Supreme Court rules that an abutting land owner, who owns merely an easement in the street, cannot recover for injuries which result from the legal and reasonable use of the street by a railroad company, where the right of egress and ingress is reasonably sufficient; nor can he recover damages for injury to him by the street being graded by the company when the work was done under the supervision of the city. In this case the street occupied by the company, excluding the sidewalks, is 45 ft. wide. The tracks, two in number, occupy the centre of the street, the rails being flush with the level of the street. The clear spaces on either side of the tracks are 12¼ ft. wide, enough for an ordinary vehicle, when the tracks are in use. About 14 regular trains use these tracks each 24 hours. Since the street has been paved, the ordinary traffic on it has greatly increased. The court rules that the evidence fails to show that the abutter's right of ingress and egress had been destroyed or materially obstructed.[8]

In Indiana the Supreme Court decides that in an action against a railroad for breach of a covenant to fence the right of way conveyed to it by plaintiff, it is immaterial that the wrong corporation is named in the deed as the grantee, where the defendant accepted the deed and enjoyed the land, as it cannot claim under the deed and repudiate the covenants.[9]

In Missouri the Court of Appeals rules that a railroad is not liable for killing stock on its track unless the stock got on the track at a place where the company is required to fence, no matter where it may be killed or injured. The place of killing and injury will be presumed to be the place of entrance, in the absence of proof to the contrary; and, if the place of killing or injury or of entrance on the track is not shown, the company is not liable.[10]

Injuries to Passengers, Employes and Strangers.

In New York the plaintiff and his father held two tickets, purchased at reduced price, good for a continuous passage on train 59 from W. to R. Plaintiff's father presented the tickets to the door-keeper at W., and asked what train they called for. The door-keeper, pointing to a train, said, "That is the train," and ordered him to pass on. The father then went back for his overcoat and plaintiff, and when he returned he again presented the tickets. He was directed to the same train as before, which plaintiff and his father then entered. After the train had started the conductor looked at the tickets; told plaintiff and his father that they were not on train 59; that they would have to get off at H., the next station, and wait for train 59. When train 59 reached H., plaintiff and his father, who were asleep in the waiting-room, were awakened by the station agent, and entered the train, but they were ejected by the conductor. The Supreme Court hold that the railroad is liable for the ejection.[11]

The United States Circuit Court in Mississippi rules that it is the duty of the conductor and employes operating a freight train, as to which some accommodations have been provided for passengers, to give passengers thereon such attention and care as are consistent with the operation of the train, but not such strict attention and care as are required of the employés on regular passenger trains; and a person riding on such freight train, who is injured by the negligence of the employés, is not entitled to as heavy damages as if the accident had occurred on a passenger train.[12]

In Missouri, the Court of Appeals holds that in an action by a physician for personal injuries, evidence showing the amount of plaintiff's professional earnings prior to the injury, and the extent to which they were diminished in consequence of the injury, is admissible, as indicating the proper elements of damages.[13]

In Texas, the Federal Court rules that a car inspector is not a fellow-servant with a brakeman, but is a representative of the employer.[14]

In Minnesota the defendants were engaged in grading a line of railroad. The work was done by cutting down one part, and with the material making a fill in another part adjacent. The material was conveyed from the cut to the fill in dirt-cars. In the dump these cars were run on a track laid on a temporary trestle, constructed with materials furnished on the ground by defendants; and, as the dump was filled, this trestle was from time to time extended. Part of the men worked in the cut, others drove the teams which drew the cars, others unloaded the cars and shoveled on the dump, and another, one J., framed the bents and built the trestle, but all were subject to be called, on the order of the foreman, from one part of the work to another. A foreman was in charge of the work and gave all the orders to the men, where to work, and what to do. He also hired and discharged men on the work. On the occasion in question, it being desired to raise additional bents and lengthen the trestle, he called upon plaintiff and one P. to assist J. While plaintiff, P., and the foreman were on the trestle, attempting to shove out two stringers to reach the new bent, the trestle, not being properly braced, fell, and plaintiff was injured. The Supreme Court rules that the foreman and the plaintiff were fellow servants.[15]

In Georgia, an employé was working under a car in the car yard when it was struck by a switch-engine, and he was killed. A rule of the company required a danger signal in such cases, which rule was applicable alike to the deceased and his immediate superior. The Supreme Court rules that the neglect of the superior to obey the rule did not excuse the employé, and the company is not liable.[16]

In Lousiana, the plantiff was riding on a horse over a bridge maintained by the railroad over its track, when one of the planks broke under their weight, and he was injured. The railroad was held liable by the Supreme Court.[17]

In New York three witnesses said that the deceased approached the track at a rapid rate, looking directly ahead, and making no movement to see the approaching engine, and that they called to him, but he appeared not to hear until he got upon the track. At any point within 70 ft. of the crossing decedent could have seen the track for a considerable distance in the direction from which the engine was coming, if he had looked. The accident occurred on Sunday, on which day engines were seldom moved on defendant's road. The Court of Appeals holds that his negligence in not stopping to look and listen was such as to preclude a recovery, though the engineer did not give the signals required on approaching a crossing.[18]

In New York, as the plaintiff was entering his cellar, he was struck on the head by a bar of iron. The tracks of defendant's elevated railroad passed in front of plaintiff's premises, supported on elevated iron structures, and at the time of the accident a train was passing overhead. The bar was seen descending from the train, and its flight was observed from the time it began to fall until it struck plaintiff. The Supreme Court holds that this shows negligence on the part of the railroad.[19]

In Alabama the Supreme Court rules that where a passenger on a street car is injured by a collision between the street car and the cars of a railroad company, the negligence of the street car company contributing proximately to the collision is not imputable to the passenger so as to place him under the same disability to sue and recover against the railroad company as the street car company would be if it were suing. The concurring negligence of the two companies may create a joint and several liability, but it does not exonerate either."[20]

The Supreme Court of Illinois decides that, even in the absence of statutory and municipal regulation, a railroad company has no right to run its freight trains through a populous city, even in places where the general public has no right to be, at any rate of speed consistent with the safety of its employés and the property on the train, but such rate of speed must be regulated by a due regard for the safety of the public.[21]

1 Wood v. C., S. F. & C. R. Co., 39 Fed. Rep., 52.
2 Loeb v. Chur., 6 N. Y. Supp. 296.
3 Re Marks 6 N. Y. Supp., 105.
4 Theobold v. L., N. O. & T. R. Co., 6 South. Rep., 230.
5 People's R. C. v. S. B. & N. Y. R. Co., 6 N. Y. Supp., 326.
6 C. I. & B. R. Co. v. B. C. Co., 6 N. Y. Supp., 108.
7 V. & M. R. Co. v. Bradley, 6 South. Rep., 321.
8 Iron Mountain R. Co. v. Bingham, 11 S. W. Rep., 705.
9 L. N. & C. R. Co. v. Power, 21 N. E. Rep., 751.
10 Pearson v. C., B. & K. C. R. Co., 33 Mo. App., 543.
11 Elliot v. N. Y. Cent. & H. R. R. Co., 6 N. Y. Supp., 363.
12 Reber vs. Bond, 38 Fed. Rep., 822.
13 Griveaud v. St. L., C. & W. R. Co., 33 Mo. App., 458.
14 Carpenter v. Mexican Nat. R. Co., 39 Fed. Rep., 315.
15 Lindvall v. Woods, 42 N. W. Rep., 1,020.
16 Cent. R. & B. Co. v. Kitchens, 9 S. E. Rep., 827.
17 Caldwell v. V. S. & P. R. Co., 6 South. Rep., 217.
18 Collins v. D. & H. Co., 21 N. E. Rep., 716.
19 Maher v. Manhattan R. Co., 6 N. Y. Supp., 309.
20 Geo. Pac. R. Co. v. Hughes, 6 South Rep., 413.
21 C. & N. W. R. Co. v. Dunlevy, 22 N. E. Rep., 15.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Delaware, Lackawanna & Western, quarterly, 1¾ per cent., payable Jan. 20.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chesapeake & Ohio, special, Pace House, Richmond, Va., Jan. 20.

Columbus, Hocking Valley & Toledo, annual, Columbus, O., Jan. 14.

Croton Valley, special, 48 Wall street, New York City, Jan. 14.

Indianapolis, Decatur & Western, special, Indianapolis, Ind., Jan. 30.

Little Miami, annual, Cincinnati, O., Jan 28.

Louisiana North & South, annual, Gibsland, La., Jan. 15.

McKeesport & Bellevernon, annual, 111 Fourth avenue, Pittsburgh, Pa., Jan. 13.

McKeesport & Bessemer, annual, 111 Fourth avenue, Pittsburgh, Pa., Jan. 13.

Montgomery & Bell, special, Montgomery, Ala., Jan. 6.

New York, Ontario & Western, annual, 16 Exchange Place, New York City, Jan. 15.

Rome, Watertown & Ogdensburg, annual, 96 Broadway, New York City, Dec. 28.

St. Catherines & Niagara Central, annual, St. Catherines, Ont., Jan. 27.

St. Louis, Indianapolis & Eastern, special, Sullivan, Sullivan County, Ind., Jan. 7.

Utah Midland, annual, Walker House, Salt Lake City, Utah Ter., Jan. 6.

Western Counties, annual, Yarmouth, Nova Scotia, Feb. 12.

Western New York & Pennsylvania, annual, 242 South Third street, Philadelphia, Pa., Jan. 13.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* will hold its next annual meeting at the rooms of the Society, 127 East Twenty-third street, New York City, Jan. 15, at 10 o'clock.

The *Ohio Society of Surveyors and Civil Engineers* will hold its next annual meeting in Columbus, Ohio, beginning Jan. 21.

The *Association of American Railway Accounting Officers* will hold a regular meeting at the St. Charles Hotel, New Orleans, La., Jan. 22.

The *Master Car Builders' Association* will hold its next annual convention at Old Point Comfort, Va. Rooms should be secured of Mr. F. N. Pike, manager, Hygeia Hotel, Fortress Monroe, Va.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Girard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the Fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Civil Engineers' Club of St. Paul.

We have received minutes of the regular meetings of October, November and December. A committee appointed to report on the question of union of local societies with the American Society said, "We believe that the work to be done by the several societies is sufficiently broad and varied to give ample scope to separate organizations. Matters of universal or national importance will naturally go to the American Society, and the local societies can better attend to matters of local interest, such as pertains to good fellowship of the profession." It was considered, therefore, undesirable to carry out the suggestions of affiliation. This report was accepted. The papers read at the three meetings were: The Dam of the St. Cloud Water Power Co., by Mr. C. J. A. Morris; one on United States Laws Relating to Bridging of Navigable Streams, by Mr. Powell, and one by Mr. F. Freyhold, on Methods of Taking Topography Over Extended Areas.

Engineers' Club of Cincinnati.

At the annual meeting the following officers were elected: G. B. Nicholson, President; R. L. Reed, Vice-President; J. L. Hilgard, L. W. Matthewson and Ward Baldwin, Directors, and J. F. Wilson, Secretary and Treasurer.

Engineers' Club of Kansas City.

A regular meeting was held Dec. 2 and the annual meeting Dec. 4. Mr. Thomas Callahan was elected an associate. Mr. F. E. Sickles read a paper on snow plows. The present total membership of the club is 83.

Engineers' Club of Philadelphia.

A regular meeting was held Dec. 21, 1889, President William Sellers in the chair; 21 members and three visitors present.

The secretary presented, for Prof. W. H. Burr, some notes on the application of electric motors to elevated railroads. The author states that this paper is not designed to advocate any particular system, but to provoke discussion of the subject. He shows that there are no greater difficulties in the way than have been overcome on surface lines, and that no insurmountable engineering problem exists in connection with the application of electric power to lines on elevated structures. He notes the advantages obtained in an electric locomotive on account of the absence of reciprocating parts in the wheels, thus avoiding the shocks and vibrations of the elevated structure which are consequent upon the use of the counterbalanced drivers of the steam engine. These are but a few of the reasons given by the author to show that this system of transit may be made a perfect success.

The secretary presented for Mr. G. W. Chance a paper upon "Right of Way." The author notes the importance of this subject in view of the enormous growth of our railroad systems and their immense landed interests. The paper is divided, first, into "Method of Obtaining Originally," and this part of the subject is sub-divided under the heads of "Location Surveys" and "Legal Papers." The second division of the paper is "Correcting the Originality of the Original," which is sub-divided into "Re-surveys" and "Re-examination of Old Papers." Re-surveys is again sub-divided into "Field Work" and "Office Work."

Mr. James Christie presented Notes on Riveted Joints. He confined his remarks entirely to single riveted lap joints as commonly used in the circular seams of steam boilers, and gave a history of a series of experiments, an analysis of which shows, he states, that an increase of efficiency was found to be due to the clamping force exercised by the rivet heads, with possibly a slight gain due to better bearing service, and that no instance was known of this binding of the joint, due to increase of rivet area, failing to show an enlarged resistance to rupture.

Mr. Arthur Marichal presented, for himself and Mr. John C. Trautwine, Jr., a translation from the French of a pamphlet published by the prominent hydraulician, M. Bazin, giving the results of very extensive experiments on the Flow of Water over Weirs. The pamphlet explains in detail the method of gauging, and describes the instruments used for that purpose. It gives the results of several hundred observations, and from these results are deduced coefficients, which will be found very useful to engineers in charge of gauging operations.

Master Car Builders' Convention of 1890.

The Executive Committee of the Master Car Builders' Association announces that the next Annual Convention will be held at Old Point Comfort, Va., commencing Tuesday, June 10, 1890. The headquarters of the association will be at the Hygeia Hotel, the management of which has named a uniform rate of $3 per day for all who attend the convention. The Committee of Arrangements consists of Messrs. Wade, Day and Demarest, but members who wish to engage rooms in advance should address Mr. F. N. Pike, manager Hygeia Hotel, Fortress Monroe, Va.

The Executive Committee regrets that Charleston, S. C., the place selected at the last convention, is ineligible on account of insufficient hotel accommodations for a fairly well attended convention of the association, because the committee realizes that the well-known hospitality of Charleston would have ensured a pleasant reception to the association.

The committee also found Look-Out Mountain near Chattanooga, Tenn., ineligible for the same reason.

New England Railroad Club.

The next meeting will be held at the United States Hotel, Boston, Wednesday, Jan. 8, at 7:30 p. m. The subject for discussion is "Notes of Foreign Travel." A number of gentlemen who have recently been abroad are expected to speak.

Ohio Society of Surveyors and Civil Engineers.

The next annual meeting of this society will be held at Columbus, O., Jan. 21, 22 and 23.

PERSONAL.

—Mr. Henry Yonge, Superintendent of the Southern Division of the Mexican National has resigned, and will return to the United States, where he has accepted a position.

—Judge James H. Ferguson, who has for several years been Chief Counsel for the Chesapeake & Ohio in West Virginia, has tendered his resignation. He has been retained as counsel in several suits against the road.

—Mr. James T. Gardner, formerly Superintendent of the Buffalo, Rochester & Pittsburgh, has been appointed General Manager of the Cincinnati, Jackson & Mackinaw.

—Mr. Thomas P. Barry, formerly in the Passenger Department of the Cincinnati, Washington & Baltimore, has been appointed Assistant General Passenger Agent of the Iowa Central to succeed Mr. A. D. Dwelle, resigned.

—Mr. Henry D. Wallen, a former army officer, and for a time Superintendent of a branch of the Pittsburgh, Fort Wayne & Chicago, at Pittsburgh, died in New York, Dec. 24, after a long illness. He had been engaged in the iron business at Grand Rapids, Mich., for the last 15 years.

—Mr. J. S. Talbott, Passenger Agent for the Chicago, Milwaukee & St. Paul at St. Joseph, Mo., has been transferred to Denver, with the title of General Agent. Mr. William M. Winton, Assistant Passenger Agent at Kansas City, has been appointed Passenger Agent at St. Joseph.

—Mr. Isaac H. McEwen, Trainmaster of the Buffalo division of the New York, Lake Erie & Western, has been appointed Superintendent of the Western division of the Rome, Watertown & Ogdensburg, to succeed Mr. Edgar Van Etten, who has been elected Manager of the Buffalo Car Service Association.

—Mr. Paul Morton, whose resignation as General Freight Agent of the Chicago, Burlington & Quincy was referred to last week, is to retire from the position Feb. 1, when he will become Vice-President and General Executive Officer of the Colorado Fuel & Coal Co., and the White Breast Coal Co., of Illinois and Iowa, at Chicago.

—Mr. Simon Borg, of the banking firm of Simon Borg & Co., New York City, has been elected President of the New York, Susquehanna & Western to succeed Mr. Charles M. Heald, who was elected to the position at the previous annual meeting. Mr. Heald was formerly General Freight Agent of the Philadelphia & Reading.

—Mr. B. F. Dickson, formerly Principal Assistant Engineer, but since January last, Assistant Superintendent of the South & North Alabama and Birmingham Mineral divisions of the Louisville & Nashville, has been appointed Superintendent of the Henderson and St. Louis divisions of the road, to succeed Mr. Donald Allen who resigned a short time ago.

—Hon. Frank Jones, of Portsmouth, N. H., was this week elected President of the Boston & Maine road, to succeed Mr. George C. Lord, resigned, who has been President of the company since December, 1881, and a director since 1866. His successor has been for many years a prominent director of the Boston & Maine, Maine Central, and many other Eastern companies.

—Mr. George H. McIntire, since 1867 Superintendent of the Franklin branch of the Lake Shore & Michigan road has resigned to accept another position with the company, and has been succeeded by Mr. T. W. Niles, Assistant Superintendent. Mr. McIntire has also been Superintendent of the Youngstown and Sharon branches of the road, and has had charge of the former since 1874.

—Mr. George W. Stevens, who was appointed Division Superintendent of the Chesapeake & Ohio at Richmond last November, has been appointed General Superintendent of the road. Mr. Stevens was Assistant General Superintendent of the Wabash under the Receivership and had charge of the same territory after the reorganization, with the title of Superintendent of the Eastern Division.

—Mr. S. O. Brooks, who has been Division Freight Agent of the Chicago, St. Paul & Kansas City since Aug. 1 last, has been appointed Assistant General Freight Agent, to succeed Mr. T. A. Whitmore, resigned. Mr. Brooks has been connected with the Chicago, St. Paul & Kansas City since last April, first as Contracting Freight Agent at St. Joseph, and later as Commercial Agent at Kansas City.

—Mr. Joseph Ramsey, Jr., Chief Engineer of the Cincinnati, Hamilton & Dayton, has been appointed assistant to the President of the Cleveland, Cincinnati, Chicago & St. Louis to succeed Mr. W. M. Green, made General Manager. Mr. Ramsey has been connected with railroad engineering since 1869, serving first with the Pittsburgh, Cincinnati & St. Louis. He has been Chief Engineer of the Cincinnati, Hamilton & Dayton since 1883.

—In a notice of the death of an eminent German railroad engineer, Mr. A. C. W. Funk, who practiced his profession for 45 years, it is given as evidence of his extraordinary capacity that in the course of his career he did the preliminary work for 952 miles of railroad, and constructed 543 miles; and that he disbursed $29,626,000 for new construction and $6,250,000 for maintenance of road. These figures will probably not appear very large to some American engineers.

—Mr. Francis Cope, General Freight and Passenger Agent of the Mountain Division of the Union Pacific at Salt Lake City, Utah, died in that city Dec. 29. Mr. Cope was formerly General Freight and Passenger Agent of the Utah Central, his title being changed at the time of the consolidation of the Western lines of the Union Pacific. He had been in the employ of the Utah Central since 1869, beginning as a clerk and serving successively as Chief Clerk, Agent and General Freight and Passenger Agent, being appointed to the latter position in 1881.

—Mr. John C. Gault, General Manager of the "Queen & Crescent" lines, has resigned that position, and is to be succeeded by Mr. Richard Carroll, General Superintendent. Mr. Gault has been a prominent railroad manager for many years, and has been Assistant General Manager of the Chicago, Milwaukee & St. Paul and General Manager of the Wabash. He has held his present position since July, 1885. Mr. C. C. Harvey, Vice-President and Comptroller, has been appointed Traffic Manager, and Charles H. Davis has been made Comptroller of the road.

—The following changes on the Illinois Central have been announced to-day: C. A. Beck, Acting General Manager, has been appointed General Manager; A. W. Sullivan, Acting General Superintendent, has been appointed General Superintendent at Chicago; E. G. Russell, Acting Superintendent of lines in Illinois and Wisconsin, has been appointed Superintendent of Northern Lines at Chicago, and with jurisdiction over the lines north of the Ohio River end east of the Mississippi River; the title of M. Gileas, Superintendent of Lines in Iowa, has been changed to that of Superintendent of Western Lines, with headquarters at Dubuque, Iowa, and with jurisdiction over the roads west of the Mississippi River, operated by the Dubuque & Sioux City.

—Mr. J. Pierpont Morgan, the well-known banker and member of the firm of Drexel, Morgan & Co., of New York, received as a Christmas gift from the Directors of the New York Central & Hudson River road, a silver dessert service of 295 pieces, made by Tiffany & Co., of New York, and understood to have cost $50,000. The gift was a recognition of Mr. Morgan's services as Chairman of the Reorganization Committee of the New York, West Shore & Buffalo, which concluded the transfer of that road to the New York Central & Hudson River line, and he was the only member of the committee not an employé of one of the two roads. As he refused to receive any compensation for his services in connection with the reorganization and transfer, either for himself or for his firm, the directors of the Central at a meeting held January 25, 1889, at which the committee was discharged, voted that the company should present Mr. Morgan with some fitting token of its appreciation of the valuable work done by him, and appointed the Chairman of the board, the President of the road and Mr. S. F. Barger a committee to have charge of the matter. The service was presented to Mr. Morgan on Christmas Eve. It is of sterling silver, heavily gilded with fine gold. It is Romanesque in style, with flowing leaves and scrolls, and is unique in design.

—Horatio Allen died at his home in Montrose, N. J., Dec. 31, 1889, at the age of 87. Mr. Allen will always be known to fame as one of the group of men who created the railroad, and as the first man to run a locomotive on this continent. He outlived all of his distinguished contemporaries. No one of the men known as having helped to build the first steam railroads now survives. In 1824 Mr. Allen was Resident Engineer on the Delaware & Hudson Canal, and for that company he imported in the winter of 1828-29 the "Stourbridge Lion," which he set up and with which he made a trial run in August, 1829. All of this has now become a part of the history of railroads, and the story of the run and of the engine has been often written. In 1829 Mr. Allen was appointed Chief Engineer of the South Carolina Railroad. He held many important engineering positions during his long and industrious life, and was for a short time President of the Erie. For many years he was one of the proprietors of the Novelty Iron Works. He was a man of originality and activity of mind, and interested himself in a great many subjects apart from his business and professional interests. He was an ardent amateur astronomer and devised several ingenious instruments for simplifying the study of that science.

Mr. Allen was a very large and robust man, of simple and industrious habits, and his physical and mental activity continued till the end of his days.

ELECTIONS AND APPOINTMENTS.

Arkansas & Gulf.—The following are the directors named in the new charter referred to last week: John D. Adams, Logan H. Roots, Little Rock; D. H. Reynolds, Lake Village, Ark.; William Bonner, Arkansas City, Ark.; J. F. O'Shaughnessey, C. H. O'Dell and W. R. Bergholz, New York City.

The directors of the company met in Little Rock, Dec. 28, and elected the following officers: President, W. R. Bergholz; Vice-President, J. F. O'Shaughnessy; Treasurer, C. H. Odell, all of New York City. William Bonner, of Arkansas City, Ark., was elected Secretary and Assistant Treasurer.

Anniston & Atlantic.—A. L. Taylor has been appointed Auditor of the road, at Anniston, Ala., vice Paul Roberts, resigned.

Atchison, Topeka & Santa Fe.—Charles R. Hudson has been appointed Assistant General Freight Agent at Topeka to succeed O. H. Brown, appointed Freight Claim Agent.

Bayonne City Terminal.—The incorporators of this New Jersey road are Ralph G. Packard, Josiah S. Packard, Thomas Potter, of Jersey City; Charles S. Noé, William H. Daly, Ezra B. Ely and Charles W. Fuller, of Bayonne, N. J.

Chicago, Burlington & Quincy.—E. J. Blake has been appointed Chief Engineer, with headquarters in Chicago, vice George C. Smith, resigned.

Chicago, St. Paul & Kansas City.—S. O. Brooks has been appointed Assistant General Freight Agent of the company, with headquarters in St. Paul.

Cincinnati, Jackson & Mackinaw.—James T. Gardner has been appointed General Manager.

Cleveland, Cincinnati, Chicago & St. Louis.—W. M. Greene, assistant to President Ingalls, has been appointed General Manager of the system, with office at Cincinnati. Joseph Ramsey, Jr. has been appointed assistant to the President, with office at Cincinnati.

Cleveland & Pittsburgh.—At the annual meeting of the stockholders the following directors were re-elected: J. N. McCullough and B. F. Jones, Pittsburgh; George B. Roberts and William Bucknell, Philadelphia; Charles Lanier and William C. Egleston, New York; F. A. Ferguson, Cincinnati; J. V. Painter, F. R. Perkins, R. P. Ranney and R. F. Smith, Cleveland, and W. W. Holloway, Bridgeport, O.

Crookston, Fort Stevenson & Montana.—The following are the incorporators of this road, referred to last week: John McLean, Morris R. Brown, John Cromb, Arthur M. Stewart, Felix Fournet, Lewis Ellington and Henry Burkhardt, all of Crookston, Minn.

Duluth & Winnipeg.—The following directors were chosen at the annual meeting in Duluth last week: A. P. Wright, C. W. Wells, Saginaw; T. B. Casey, Minneapolis; W H. Fisher, St. Paul; E. D. Childs, Crookston; Sir Roderick Cameron, New York; Donald Grant, Faribault; H. J. Boardman, Boston; R. S. Munger, Duluth.

Florida Midland & Georgia.—John R. Young, John L. Hammond, William Rogers, Peter L. Peacock, J. B. Withers, M. Y. McIntyre, and A. B. Hull, all of Savannah; T. G. Cranford and W. S. West, of Valdosta, Ga., and J. N. West, J. L. Jordan, Dr. J. P. Y. Higdon and Mr. Murch, of Madison, Fla.

Greenville & Southeastern.—The following organization of this company has just been filed in the office of the Secretary of State: Directors: D. G. Dunklin, A. G. Winkler, J. T. Steiner, W. F. McKenzie, A Steinhardt, of Greenville, and B. M. Stevens and P. N. Hickman, of Elba, Coffee County. Officers: D. G. Dunklin, President; A. Steinhardt, Secretary, and T. J. Steiner, Treasurer.

Hot Springs.—L. D. Richardson has been appointed Superintendent of the road at Hot Springs, Ark., to succeed J. N. Conger, resigned.

Indianapolis Union.—W. O. Hamilton, Auditor and Car Accountant, having resigned on account of ill health, C. A. Vinnedge has been promoted to succeed him.

Iowa Central.—T. P. Barry has been appointed Assistant General Passenger Agent, with office at Marshalltown, Ia

Kansas City, Fort Scott & Gulf.—W. C. Stith has been appointed General Freight Agent of the road at Kansas City, Mo., to succeed H. A. Johnson, resigned to go to the Union Pacific.

Kansas City, Louisiana & Gulf.—The names and addresses of officers of this company are now as follows: A. M. Jackson, President; George W. Simonds, Secretary, Atchison, Kan.; J. H. Dawson, Chief Engineer and Manager, Jennings, La.; John K. Fisher, Treasurer; J. L. Bliss, Auditor, and M. T. Frame, General Attorney, Atchison, Kan

Kansas City, Wyandotte & Northwestern.—W. C. Stith has been appointed General Freight Agent at Kansas City, Mo., to succeed H. A. Johnson, resigned.

Knox & Lincoln.—The directors have re-elected the following officers: President, J. Berry, Rockland, Me.; Clerk, J. G. Richardson, Bath, Me.; Treasurer, F. H. Low, Bath; Superintendent, W. L. White.

Louisville & Nashville.—B. F. Dickson has been appointed Superintendent of the Henderson and St. Louis divisions, with headquarters at Evansville, Ind., vice Donald Allen, resigned.

Missouri Pacific.—George Maclaine has been appointed Assistant General Freight Agent, with headquarters at St. Louis.

Monterey & Mexican Gulf.—The following officers and directors were elected at the recent annual meeting: President, Geronimo Trevino, Mexico; First Vice-President, Thomas S. Bullock, New York; Second Vice-President, J. J. Fisher, St. Louis, Mo.; Third Vice-President, Emeterio de la Garza, Mexico; Secretary and Treasurer, V. A. Wilder, New York; and General Manager, J. A. Robertson, Monterey, Mexico. Directors: Geronimo Trevino, Thomas S. Bullock, J. J. Fisher, Emeterio de la Garza, V. A. Wilder, J. A. Robertson and Frank Rudd.

John Grace, formerly Master of Transportation, has been appointed Superintendent of the Linares Division, with headquarters at Monterey, Mex.

New York, Lake Erie & Western.—H. F. Coyle has been appointed Train Master of the First Division, vice J. W. Babcock, resigned. A. H. Mansfield has been appointed Chief Dispatcher over Eastern Division, vice H. F. Coyle, promoted.

New York, Providence & Boston.—Charles Howard having resigned as Superintendent of the Worcester Division, J. B. Gardiner has assumed charge of the division, having been appointed Superintendent of all lines owned and leased by this company. His office is at Providence, R. I.

Ohio, Indiana & Western.—J. A. Barnard, General Manager, has assumed the duties of General Superintendent, and will appoint no successor to I. H. Wilson, who was killed in a recent train accident on the road. A. H. Palmerston has been appointed Train Master, with office at Indianapolis, to succeed J. M. Cummings, who was killed in the same accident with Mr. Wilson. Other appointments have been announced as follows: J. A. Shireley, Superintendent of Telegraph; C. N. Atkinson, Car Accountant; J. H. M. Claggett, Cashier and Paymaster.

Philadelphia & Reading.—William Hunter has been appointed Chief Assistant Engineer of the road at Philadelphia, Pa.

Rockport, Evanston, St. Meinrad & Ferdinand.—This Indiana company has elected the following directors: J. G. Eigenmann, L. R. Hardy, H. M. Logsdon, S. W. Stocking, Simeon Jaseph, J. J. Sinzich, J. F. Sulzer, Henry Kramer and John Biedenhopf.

Rome, Watertown & Ogdensburgh.—At the recent annual meeting in New York City the old board of directors and officers were reelected.

St. Joseph & Grand Island.—F. L. Linds has been appointed General Passenger and Ticket Agent, with office at St. Joseph, Mo., relieving W. P. Robinson, Jr., of that part of his duties. Mr. Robinson continues as General Freight Agent of the road.

St. Louis, Alton & Springfield.—F. G. Fisher has assumed the duties of General Passenger and Ticket Agent in addition to his duties of General Freight Agent. His headquarters will be at Springfield, Ill.

San Francisco & North Pacific.—Philip N. Lilienthal has been elected Vice-President of the company, to succeed F. F. Low, resigned on account of ill health. W. H. Menton has been appointed Assistant General Passenger and Freight Agent, with headquarters at 410 Mission street, San Francisco.

Savannah, Americus & Montgomery.—W. N. Marshall has been appointed Superintendent, with office at Americus, Ga., to succeed Capt. R. E. Hardaway, resigned.

Southwestern.—Directors of this California Company have been elected as follows: Samuel Merrill, of Des Moines, Ia.; Richard Gird and John Wasson, Chino, Cal.; George L. Joy, R. B. Taylor, South Riverside, Cal.; F. H. Heald, Elsinore, Cal., and H. A. Palmer, Berkely, Cal.

Texas & Pacific.—Lewis S. Smith, Paymaster, has been appointed Local Treasurer, at Dallas, Tex., to succeed Guy Sumpter, resigned to accept other employment.

Trout Run.—The following are the directors of the company: W. L. Torbet, Girard Manor, Schuylkill County, Pa., President; John R. Leisenring, Hazleton, Pa.; J. Frank Torbet. Jersey Shore, and John A. Titman, O. A. Keim, John F. Finney, Chas. E. Titman, all of Shenandoah.

Troy & New England.—Walter P. Warren, Charles W. Tillinghast, William A. Thompson, Edward Murphy, Jr., Henry H. Darling, Lewis E. Gurley, Edward F. Murray, Charles E. Patterson, William Kemp, of Troy, N. Y.; H. T. Cutter, New York City; James K. Averill, Sand Lake, N. Y.; Andrew J. Smart, Averill Park, N. Y., and Edgar Lynd, Poestenkill, N. Y., are the directors of this company, just chartered in New York.

Union Pacific.—The following appointments have been anuounced: C. F. Ressiguie to be General Manager of the Mountain division, with office at Salt Lake City, to succeed G. M. Cumming, resigned; J. M. Barr to be Superintendent of the Nebraska division at Omaha, to succeed C. F. Ressiguie, promoted; B. M. Ryder to be Superintendent, and R. M. Baxter to be Assistant Superintendent, of the Wyoming division, with office at Cheyenne. Mr. Ryder succeeds Mr. Barr, promoted.

Vanegas, Cedral & Rio Verde.—The officers of this Mexican road are: President, Felipe Muriedas; Treasurer and General Manager, Blas Escontria, both of San Luis Potosi; Superintendent, Harry Hale, and Chief Engineer, H. Lieberman, both of Cedral.

OLD AND NEW ROADS.

Aylmer & Port Burwell.—The company has asked the Canada Southern to undertake the construction of the road, but that company has given no definite answer. It is claimed that the road can be built for $175,000. Bridges will be necessary at Aylmer, north of Hamburg, and near Port Burwell, Ont. It is expected that bonuses of $20,000 will be obtained from Aylmer and Bayham, and $15,000 from Malahide, and the government subsidy of $3,200 per mile for the 17 miles, amounting to $54,000 additional. J. Winlow, Aylmer, Ont., is Secretary.

Baltimore & Drum Point.—The grading on that section of the road which lies in Calvert County, Md., has been about completed, and the forces at work in that county are soon to be transferred to Anne Arundel County.

Baltimore & Ohio.—An officer of the road states to a reporter that the freight blockade on the road still continues troublesome. In the first 20 days of December the road brought 2,114 carloads of corn to Baltimore, against 1,780 for the same time in December of last year, an increase of 334. Some new locomotives ordered during 1889 are yet to be delivered, and it is probable that the company will in 1890 make about the same additions to its equipment as in 1889. The Mount Clare shops now have 1,752 men on the rolls, and their capacity is fully employed in repairs to the company's equipment. These shops will have as much as they can do with the work which is assigned to them. Negotiations are going on for leasing the rolling mills at Cumberland to parties who will operate them and furnish traffic for the road.

Bayonne City Terminal.—This company has been organized at Bayonne, N. J., to build a road three and a half miles long along the shore of the New York Bay at the city of Bayonne, N. J. It is understood that the road is designed to be a connecting link between the West Shore system, which possesses a charter for one of the roads along the Newark Bay shore, and a road being built along the New York Bay shore. The proposed route starts from a point near the Newark Bay bridge of the Central of New Jersey, and runs along the bay shore to Robineau's Point, and along the Kill-von-Kull to Bayonne, and crossing the Constable Hook branch of the Central of New Jersey at grade. The capital stock of the company is $600,000.

Boston & Lowell.—The annual meeting of the stock holders of the company was held in Boston Jan. 1. The receipts of the year ended Sept. 30, 1889, were $789,028. Dividends amounting to $387.058 were paid, together with $36?,899 interest on the funded debt, $22,891 on the unfunded debt, and $7,000 for organization expenses. It was voted to authorize the issue of $350,000 four per cent. 20 year bonds, dated April 1, 1889, for paying for improvements made under the lease of the road to the Boston & Maine. A special meeting of stockholders was held to take action on the approval of the lease of the Northern (N. H.) road upon the terms agreed upon by the directors of both companies. The vote resulted in the unanimous approval of the lease.

Brantford, Waterloo & Lake Erie.—This company will ask the Dominion Parliament for power to lease or amalgamate its line with the Toronto, Hamilton & Buffalo, to amend the powers of the company as to the issue of bonds, and to increase the capital stock.

Canadian Pacific.—Tracklaying on the 112-mile extension of the Ontario & Quebec division from London southwest through Chatham to Windsor, Ont., opposite Detroit, Mich., has been completed, the track, which has been laid from both ends, being joined last week. The grades do not exceed 15 ft. per mile. The roadbed is built in a most substantial manner, with steel bridges and masonry abutments and piers. There are bridges over the Thames River at London, and near Chatham. The cuttings between London and Komoka are heavy. The London, Huron & Bruce road is crossed overhead, necessitating the construction of a heavy embankment, with steel spans on masonry abutments. A slip for the ferry steamers at Windsor has been constructed, and it will be supplemented by the addition of a second one in the spring. The road is now open for freight traffic between London and Windsor.

The statement of the earnings and expenses of the road for the month of November shows gross receipts of $1,493,697 and expenses of $778,978, leaving a net profit of $714,719, an increase of $135,147 over the same month last year. The gross earnings from Jan. 1 to Nov. 30 were $13,764,889, and expenses $8,275,523, leaving a net profit of $5,489,336, an increase of $2,037,232 over the same period last year.

The directors have decided to declare a supplementary dividend of one per cent., payable Feb. 17, with the regular 1½ per cent. half-yearly dividend, from the annuity fund in the hands of the Dominion government, making a total for the half year of 2½ per cent. The directors expect to be able to continue a similar half yearly supplementary dividend until the expiration of the annuity in 1893. A dispatch from Ottawa states that the total cash payments by the Dominion government for the construction of the road to June 30 last were $61,899,600. Besides the cash payments the government has given 25,000,000 acres of public lands.

Chesapeake & Ohio.—The Richmond (Va.) *Dispatch* contains an interview with President M. E. Ingalls, in which he states that the business of the entire system has been surprisingly large. The passenger service has been improved and the travel has greatly increased. Between 40 and 50 new iron bridges, ranging in span from 30 to 200 ft., have been put up. When five more iron bridges shall have been built, which will be shortly, there will be no wooden truss bridges on the line. Within the past year 100 miles of new rails, weighing 75 lbs. to the yard, have been laid over the mountain divisions, and rolling mills are now delivering rails for another 100 miles. Several branch lines in Virginia are contemplated.

Chicago & Northwestern.—The Secretary of the Interior has issued a decision ordering the Winona & St. Peter to restore to the United States 12,480 acres of land in Southern Minnesota, to which the title has been in dispute. It is now covered with settlements and very valuable. A large number of settlers will be relieved of burdensome litigation in perfecting their titles.

Choctaw Coal & Railway Co.—In our issue of Dec. 13, we printed a rumor to the effect that Garvey Bros. had been awarded a contract to build 50 miles of the Denison & Washita Valley road, from McAlester to Cavanial, I. T., on the St. Louis & San Francisco. This contract was let by the Choctaw Coal & Railway Co., which is an entirely distinct corporation from the Denison & Washita Valley road. It is owned in Philadelphia, and its President and Directors are principally general officers of the Lehigh Valley, Mr. Charles Hartshorne, First Vice-President of the Lehigh Valley being President of this Company, and Mr. William C. Alderson, Treasurer of the Lehigh Valley, is Treasurer of this road. This company is building across the Indian Territory east and west from the Arkansas line to Fort Reno, I.T., connecting the St. Louis & San Francisco, the Missouri, Kansas & Texas, the Atchison, Topeka & Santa Fe and the Chicago, Kansas & Nebraska. From the west line of Arkansas it is designed to extend the road to Little Rock at an early date, and from Ft. Reno west to a connection with the Ft. Worth & Denver in the Pan Handle of Texas. The contract of Garvey Bros. is for the remaining 50 miles to connect with the Missouri, Kansas & Texas and St. Louis & San Francisco. They have been at work for this company for four months past, and are at work east and west from McAlester at the present time. Forty miles of the road is now completed from McAlester to La Fourche Maline, I. T. E. D. Chadick, of McAlester, is Manager.

Cincinnati, Alabama & Atlantic.—John B. Thompson has, it is stated, received the contract for constructing the road from Somerset, Ky., to near Huntsville, Ala.

Cincinnati, Jackson & Mackinaw.—The Toledo, Saginaw & Mackinaw has filed new articles of incorporation in Michigan, and changed the name of the road to the Cincinnati, Jackson & Mackinaw, thus avoiding confusion with the Toledo, Saginaw & Muskegon, arising from the similarity of names. The new charter describes the road as to extend from the state line between Michigan and Ohio, in the County of Lenawee, north, via Saginaw, to the Straits of Mackinac, and changes the southern terminus from Toledo to Cincinnati. The road was completed between East Saginaw and Durand, Mich., last year, and has since been operated by the Toledo, Ann Arbor & North Michigan. The Cincinnati, Jackson & Mackinaw operates a road from Allegan to near Toledo, and from Addison to near Cincinnati.

Georgia, Carolina & Northern.—T. L. & C. T. Houser, of Anniston, Ala., have received a large contract for grading, pile driving and trestle building on this road. The contract amounts to about $100,000.

Grand Trunk.—The engineers surveying in New Brunswick have found a favorable route from Grand Falls on the New Brunswick road to Wapskegon on the Tobique River. Beyond this point the line has been difficult. A survey was first made up the Wapska River, striking the head of the Gulquac, but after running a line for 15 miles it was found that the elevation between the head waters of the Miramichi and the Gulquac river was to great for a good line, and this route was abandoned and the party is now trying to reach the Miramichi by way of River de Chute, which is the tributary of the Wapska.

A cut-off is to be built from Stoney Creek, Wentworth County, to Hamilton Beach, Ont., about six miles.

Gulf & Northwestern.—A company of this name has been organized at Orange, Tex., and filed articles of incorporation to build several lines of road beginning at Orange. The capital is $1,000,000. H. J. Lutcher, G. B. Moore, F. J. Drick, D. Call are incorporators.

Hamilton Junction.—This company proposes to construct a road across the City of Hamilton, Ont., and east to a point near Burlington, Halton County, and west to Copetown, Wentworth County. Also to erect a Union Station in Hamilton.

Hempstead & Brazos City.—This is a projected road from Hempstead, Tex., to the mouth of the Brazos River, a distance of about 90 miles.

Kingston, Smith's Falls & Ottowa.—The survey has been completed between Ottawa and Kingston, Ont., and the surveyors report favorably on the route. Negotiations are now going on to get capital to build the road, and the government will be asked at the coming session to grant a bonus for the remainder of the distance from Kingston to the Falls.

Louisiana & Northwestern.—Organized at Homer, La., with a capital stock of $3,000,000, to build a road in a northerly direction from Bienville station to Homer, thence to the state line between Louisiana and Arkansas, and also south Alexandria, Ga.

Louisville, New Orleans & Texas.—A survey has just been completed, and some right of way obtained for a proposed line from Clarkesdale, via Yazoo City, to Vicksburg, Miss. Thirty-seven miles of this branch from Clarkesdale is now under contract.

Mexican.—About nine miles of the Pachuca branch have been graded ready for tracklaying. There is much heavy work on the branch, the line in two places going under the Hidalgo road to avoid grade crossings. In the Papalote Cañon there is some difficult work.

Midland (Indiana).—In the suit of the Loan & Investment Co., of New York, against this railroad, Judge Gresham has denied the petition of the complainants for the appointment of a receiver. He found that the complainants were amply secured for the advances which they had made the company. They contended that recent acts of the management were tending to decrease the value of the property which had been accepted as security.

Missouri Pacific.—The attorney for this road has asked the United States Circuit Court at Topeka to order that the St. Louis, Fort Scott & Wichita be resold to satisfy the claims of the Missouri Pacific.

Monterey & Mexican Gulf.—Most of the construction forces have been transferred to the northwestern extension from Monterey to Venadito, on the Mexican International. The grading between Monterey and Tampico is practically completed. The line to Vendito is expected to be finished by March 1, and then rails and other supplies for the line between Monterey and Tampico will arrive over the International from Eagle Pass, and the many delays which have occured on account of the non-arrival of material will be avoided. The greater part of the grading between Monterey and Tampico has been finished.

New Roads.—A company is seeking incorporation in British Columbia to build a road from a point on the southern boundary of the Province near the mouth of the Pend d'Orielle River northerly to Nelson, on the west arm of Kootenay Lake.

New York, Lake Erie & Western.—The following are the earnings and expenses for November and the two months from Oct. 1 to Nov. 30:

Month of November:	1889.	1888.	Inc.
Gross earnings	$2,479,171	$2,260,298	$218,873
Oper. expenses	1,575,618	1,446,635	128,983
	$903,553	$813,663	$89,890
Less proportion due leased lines	226,377	187,654	38,723
Net earnings	$677,176	$626,009	$51,167
Two months, Oct. 1 to Nov. 30:	1889.	1888.	Inc.
Gross earnings	$5,284,173	$4,822,614	$461,559
Oper. expenses	3,270,300	3,000,524	269,776
	$2,013,873	$1,822,090	$191,783
Less proportion due leased lines	476,496	409,612	66,884
Net earnings	$1,537,377	$1,412,478	$124,899

Norfolk & Carolina.—All the tracklaying has now been practically completed on this road, and it was opened for traffic its entire length Dec. 30, the first train between Tarboro and Norfolk being run on that date. Transfers are made at the Roanoke River, the bridge at that place being much delayed. The stone piers and abutments for this work are not yet in position, and when they are finished it will require three weeks more to finish the iron superstructure. The section between Norfolk, Va., and Kelford, N. C., 74 miles, has been in operation for some time, and the 26 miles, between Kelford and Tarboro were opened for traffic this week.

Northern Pacific & Manitoba.—This company has surveyors in the field for a line from a point on the Morris-Brandon branch, about midway between the Canadian Pacific main line and the Southwestern, to the boundary of the province, about 80 or 90 miles, and then into Alberta, about 120 miles to the coal fields.

Oregon Short Line & Utah Northern.—The stockholders, at a meeting held in Salt Lake City, Utah, last week, voted to issue five per cent. first mortgage bonds at the rate of $25,000 per mile for the whole system of 1,300 miles. They also voted to extend the Idaho division into the National Park 160 miles from Eagle Rock.

Owen Sound & Lake Huron.—This company is applying to the Dominion Parliament for a charter to construct a line from Owen Sound, Ont., through the villages of Tara and Paisley, to a point on Lake Huron, near Goderich, and also to a point on Lake Huron near Kincardine.

Pennsylvania.—The company has let the contracts for the construction of the new "Cut-off" line from Downingtown to Morrisville, Pa., opposite Trenton, N. J. The distance is 53 miles. The present route from Downingtown to Morrisville via West Philadelphia is 60 miles. While the saving in distance via the new line is only seven miles, yet the relief which will be afforded the New York and Philadelphia divisions between Trenton and Downingtown will be equal to fully 50 per cent. of the gross traffic. The line, as surveyed, parallels the Chester Valley branch of the Philadelphia & Reading from Downingtown to Henderson, near Norristown. From thence the line will run northeast on a tangent to above Swedesboro Station and cross overhead the tracks of the Philadelphia & Reading main line on the west bank of the Schuylkill. The route is then through Magee, Plymouth, Sandy Run, Doylestown and Heaton to Morrisville, where it connects with the main line of the New York Division of the Pennsylvania on the west bank of the Delaware. It is the intention to ultimately make the new branch double track, but at present only one track will be constructed, though the bridges and stone culverts will be built to accommodate two tracks. The construction work will be pressed, and it is expected that the road will be in operation by Dec. 1, 1890.

The earnings of all lines of the company east of Pittsburgh and Erie for November, 1889, as compared with the same month in 1888, show an in-

crease in gross earnings, of $631,946; in expenses, of $370,934; in net earnings of $261,012. The eleven months of 1889, as compared with the same period of 1888, show an increase in gross earnings of $2,655,185; in expenses, of $1,546,862; in net earnings, of $1,108,323. All lines west of Pittsburgh and Erie, for the eleven months of 1889, show a surplus over all liabilities of $921,124, being a gain, as compared with the same period of 1888, of $1,071,558.

The company has declined to engage in the project of building a road from Phœnixville, Chester County, Pa., to Allentown, Lehigh County, via Boyertown, 40 miles, and the scheme has therefore been abandoned.

The survey has been completed for a branch from a point on the Butler branch of the West Pennsylvania branch near Freeport, Pa., north eight miles up Butler creek to the old Winfield furnace, where there are rich deposits of ores. The road is to be completed by July 1, 1890. Work will be commenced at once.

Pittsburgh & Knoxville.—The Virginia Legislatnre has incorporated this company to build a road from a point on the Clinch River and following it some distance, and thence continuing to Knoxville, Tenn.

Qu'Appelle, Long Lake & Saskatchewan.—Work on this road has stopped and the men have been paid off. Although it was late in the season when the work started, 154 miles of road have been graded and 120 miles of track laid. This takes the grading up to Saskatoon. The line has been located to Prince Albert. Mr. Holt, the contractor, says that work will be resumed next March and pushed until Prince Albert is reached, which it is expected will be done by Oct. 1. The building of the large bridge over the Saskatchewan, at Saskatoon, will delay the completion of the road considerably.

Quebec Roads.—Application will be made to the next Provincial Legislature for an act to incorporate a company to construct a road from either Lachute, St. Jerome or St. Sauveur to Montfort, and to a point on the Rouge River in the township of Arundel, P. Que.

Application will also be made for a charter to construct a road from Lacolle to a connection with the Canada Atlantic, and thence to West Farnham on the Canadian Pacific.

Rio Grande Western.—The company has let the contract for a 25-mile extension from Thistle west toward Marysville, Utah. Thistle is a station on the Rio Grande Western, in Utah County, 66 miles southeast of Salt Lake City.

Rockport, Evansville, St. Meinrad & Ferdinand.—This company has been incorporated to build a road in Southern Indiana from Rockport to Ferdinand, Dubois County, through Grandview, Newtonville, Evanston and St. Meinrad. This line will be about 35 miles long, through a good agricultural region and a section of country rich in coal-fields, timber and building stone. The capital stock is $525,000.

Rockport, Langdon & Northern.—This company has been organized in Missouri to build a road six miles long from Langdon to Rockport, in Atchison County. The incorporators are Archibald E. Wyatt, Robert Hunter, John W. Smith, Henry Warneke and John P. Lewis. The capital stock is $90,000.

St. Lawrence International.—This company is applying to the Dominion Parliament for incorporation, with power to construct a road from a point near Lansdowne Station, on the Grand Trunk, in the County of Leeds, to a point on the international boundary line at the St. Lawrence River, to connect with roads in the state of New York, by a bridge over the river.

St. Louis Railroad Terminal Association.—The company has mortgaged its property in favor of the Central Trust Co., of New York, to secure an issue of $7,000,000 bonds bearing 4½ per cent. interest. The property deeded by the association is the property formerly owned by the Union Railway & Transit Co. and the Terminal Railway Co., at St. Louis.

Southwestern.—The company has filed articles of incorporation in California with a paid-up capital stock of $242,000, to build a road from the cities of San Diego and Los Angeles to a point in or near the Cajon Pass, in San Bernardino County, an estimated length of 220 miles. The Pomona & Elsinore, which was graded last year from Pomona to Riverside, Cal., has been merged in this company. John Wasson, of Chino, Cal., is a director.

Summerville & St. Johns.—The South Carolina Legislature has been asked for leave to extend this road from Summerville to Charleston, and on to a point on the North Carolina line in Lancaster or Chesterfield counties.

Toledo, Saginaw & Mackinaw.—The company has filed a new charter in Michigan, changing the proposed southern terminus from Toledo to Cincinnati, and also changing the name of the road to the Cincinnati, Jackson & Mackinaw.

Trout Run.—Chartered in Pennsylvania to build a road from Cammal, Lycoming County, connecting there with the Fall Brook Coal Co.'s road, and extending to Hyner, Clinton County, to a connection with the Philadelphia & Erie. The distance is nine miles. The capital stock is $250,000. W. L. Torbet, of Girard Manor, Pa., is President. The office of the company is at Shenandoah.

Troy & New England.— This company has been chartered in New York to construct a road from Troy to Canaan, N. Y., near the dividing line between the states of New York and Massachusetts. The length of the road is 35 miles and the capital stock is $350,000.

Union Pacific.—In an interview in Boston last week, President Adams spoke as follows: "The Oregon Short Line & Utah Northern has now a clear field with no floating debt. Its accounts with the Union Pacific are discharged under the recent settlement under which the latter took bonds for the advances made. The Oregon Navigation and Oregon Short Line business has been adversely affected by the dry winter of 1888-89. No snow on the mountains in Oregon means a light crop of wheat in the valleys the following season. The Oregon Short Line will suffer a loss of half a million dollars this year through the Oregon Navigation, but will nevertheless earn a surplus over all interest charges. This deficit next year should be much smaller, if it is not wholly wiped out. The Oregon Short Line will also have next year earnings from the Spokane Falls line, just finished, and from the Cœur d'Alene extension, both of which will yield large business. The building of the 145 miles into the Pioche country and the widening of the gauge from Ogden north will necessarily furnish a large additional business next year in the territory of the Oregon Short Line system.

The Senate committee investigating the Pacific roads recently asked us for statistics as to the benefit to the Union Pacific of its branch line system. We took the figures of the largest branch system, and were astonished to find that the net amount earned by the Union Pacific on traffic interchanged with the Oregon Short Line & Utah Northern was $2,500,000. In other words, the Union Pacific would not to-day be earning any surplus over its interest charges but for the business done with the Oregon Short Line system. The company will not move rapidly in the way of new construction. The entire Union Pacific system will only build 200 miles of additional road next year, 145 miles in the Oregon Short Line system to Pioche, where the line will rest for the present, 35 miles to connect the Cheyenne & Northern with the Elkhorn division of the Chicago & Northwestern system, and 20 miles to make connections in Kansas. All the stories now current in newspapers as to plans and extensions, and purchases of the Union Pacific on the Pacific slope, are pure inventions, absolutely without basis.

Union Pacific.—The statement for November shows gross earnings of $2,880,408, an increase over the same month last year of $166,188. The net earnings were $970,380, a decrease from the same period last year of $75,611. For the eleven months in 1889 the gross earnings were $28,285,473, an increase of $601,625; the net earnings were $11,572,583, an increase of $827,535. The expenses decreased $225,909 in the eleven months.

The terms of the consolidation of the Union Pacific's Colorado lines with the Denver, Texas & Fort Worth are as follows:

Certain branch companies of the Union Pacific, namely: the Colorado Central, the Denver & Middle Park, the Denver, Marshall & Boulder, the Georgetown, Breckenridge & Leadville, the Greeley, Salt Lake & Pacific, and the Cheyenne & Northern, an aggregate of 505 miles of road, are to be consolidated with the Denver, Texas & Forth Worth, extending from Denver, Col., to Forth Worth, Tex. The new company will be known as the Union Pacific, Denver & Gulf. It will be 1,435 miles long, and will have a capital stock of $25,000 per mile and a mortgage bond indebtedness of not exceeding $25,000 per mile. Such new bonds as may be issued will bear five per cent. interest. Holders of Denver, Texas & Fort Worth stock or bonds will receive an equal amount of the new company's stock or bonds in exchange. The amount of stock per mile outstanding when the consolidation is effected will be $23,494, and the amount of mortgage bonds $20,913 per mile. The new company's lines of railroad will be part of the Union Pacific system and under its management, and the Union Pacific will hold a majority of the capital stock.

Vanegas, Cedral & Rio Verde.—This road is now built and operated as far as Cedral, 16 miles from Vanegas, a station of the Mexican National, about halfway between Saltillo and San Luis Potosi, and 483 miles north of the City of Mexico. The line extends nearly due east, with a few four degree curves and about two miles of one and a half per cent. grade; the balance of it is ordinary work. Eight miles from Vanegas a branch commences toward the celebrated Catorce mines, and of this there is seven miles graded, and rails from England for tracklaying are now arriving. This branch starts with a two and a half per cent. grade and ends with a four per cent. grade; the maximum curvature is 11 degrees, and there will be at least one 300 ft. iron bridge. This branch will be 11 miles long, to a connection with a cable road on the "Incline" plan, which has been in operation about two years. The work so far, has been done by Charles Thornton. The company has a concession and a very liberal subsidy from the government for a road from Vanegas on the Mexican National to Rio Verde on the Tampico branch of the Mexican Central, running through rich mining land and very good agricultural parts of the Republic. Little has yet been done toward extending the road beyond the present termini, and although it has been repeatedly announced that grading on the extensions would soon commence it is yet uncertain when construction work will begin again. Blas Escontria, of San Luis Potosi, is General Manager and H. H. Lieberman, of Cedral, is Chief Engineer.

Vaudreuil & Prescott.—This company is applying for an act of Parliament changing the name of the road to the Montreal & Ottawa Railway Co.

Wautauga Valley.—The company has filed a new charter in Tennessee to build a road from a point on the Charleston, Cincinnati & Chicago, at Johnson City, through Carter's Depot, Elizabethtown and Hampton, to the Fork Ridge iron mines. Another road will be built from Hampton to the Cranberry, N. C., mines.

Waukegan & Southwestern.—This company, which is constructing a line from Waukegan, Lake County, to Spaulding, Cook County, to connect with the Elgin, Joliet & Eastern, has filed for record a mortgage in favor of the Central Trust Co., of New York, to secure $1,000,000 first mortgage, 50-year five per cent. bonds.

Western of Florida.—The extension from the present southern terminus at Behnore to Melrose, about 20 miles, is nearly all completed, and the company expects to open it for traffic early this month.

Winona & Southwestern.—Tracklaying has been completed on the 10 miles between Bear Creek and Utica, Minn., placed under construction last fall. Grading is reported finished to a point 15 miles beyond Utica. It is understood that another section of 25 miles will be put under contract in a few weeks, and that possibly 100 miles to the state line will also be let.

TRAFFIC.

Traffic Notes.

The Central Traffic Association has issued a revised set of rules for billing grain to be milled in transit.

Kansas City shipped 150 double-deck cars of hogs to the City of Mexico in the first three weeks in December.

Thrall's simplex local ticket is in use on the Lake Shore & Michigan Southern and the Louisville & Nashville.

The Union Pacific and the St. Paul, Minneapolis & Manitoba have made a new traffic agreement covering business interchanged at Butte, Mont.

A Council Bluffs dispatch states that the Burlington road will put on a fast train to run between Chicago and Denver via Council Bluffs in 30 hours.

Chairman Walker has refused the application of the Iowa Central for leave to absorb cartage charges at Newton, Ia., but the road notifies him that under article 3 of the agreement it will disregard this decision.

The Canadian Pacific expects to have its line from St. Thomas, Ont., to Detroit, Mich., ready for through business within two months, and has made an agreement with the Wabash for freight to and from Chicago.

The scarcity of cars continues in Kansas, and is as severe as ever. More than one-half the corn crop still remains in the fields, and the price in some counties is less than 15 cents a bushel. Large quantities are being used as fuel.

The action of the Pennsylvania lines west of Pittsburgh in announcing reduced passenger rates for parties of 10 or more is being followed by other roads in the central territory, the Michigan Central and the Lake Shore having already announced such a change.

A Baltimore dispatch states that the Furness Steamship line has terminated its contract with the Baltimore & Ohio, and has made arrangements with the Chesapeake & Ohio for dock facilities at Newport News, Va. The agent states that six steamers are now on their way to the latter port for loads.

George A. Murray, of Rogersville, Tenn., has sent to the Interstate Commerce Commission a complaint against the East Tennessee, Virginia & Georgia concerning rates on lumber to Eastern cities, claiming that he has to pay more than is charged from Chattanooga and other more distant points.

The Chicago, Milwaukee & St. Paul has made an agreement whereby it will cease to ship any eastbound freight through the city of Chicago, and will instead make use of the Waukegan & Southwestern, the new belt line, which will send all through traffic around by way of Elgin. The Waukegan & Southwestern crosses the St. Paul at Rondout, and at that point the through traffic will be transferred.

Chairman Abbott has rendered a decision in the case brought by the Burlington against the Santa Fe. The latter was charged with having sold at Chicago three second-class tickets to Los Angeles limited to Dec. 4. The tickets were dated ahead to enable the purchasers to stop over at Galesburg. The Burlington avers that the same parties first tried to secure the tickets at its office, but, being refused, went to the Santa Fe office, where they secured them, thus depriving the Burlington of the revenue. Mr. Abbott finds the Santa Fe guilty of violation of agreement as charged, and inflicts the penalty that the road redeem those portions of the tickets between Chicago and Kansas City at full local rates.

A New Lake and Rail Route from the Northwest.

The Flint & Pere Marquette has formed a new freight route as follows: Over the Green Bay, Winona & St. Paul to New London, Wis.; thence over the Milwaukee, Lake Shore & Western to Manitowoc; thence by lake to Ludington, and thence to Port Huron by the Flint & Pere Marquette. The route from Port Huron to Buffalo will be over the Grand Trunk, and from Buffalo to New York by the Delaware, Lackawanna & Western. The distance by the new route is 1,206 miles between New York and Minneapolis; but it is not stated what road is to be used between Winona, the western terminus of the Green Bay, Winona & St. Paul and Minneapolis. The steamship "Osceola" has been chartered and will at once go on the route between Ludington and Manitowoc.

Western and Northwestern Passenger Rates.

The Chicago, Burlington & Northern last week issued a new passenger tariff to take effect Jan. 1. It quotes rates between Chicago and St. Paul $2 less than the present tariff, which is $11 first-class and $9 second-class. From St. Paul to St. Louis it reduces the present rate of $15.85 to $13. In addition it meets a number of greatly reduced excursion rates quoted by the "Soo" line from St. Paul to Canadian and New England points. The company claims to have issued the tariff unwillingly and to have been forced into so doing by the action of its competitors in secretly quoting the $9 and $7 rates to Chicago.

The Chicago, Milwaukee & St. Paul announces a reduction of $2.50 in the first class rate from St. Paul to Chicago, and other reductions. Other lines will doubtless follow. The dissolution of the Western States Passenger Association is followed by various announcements of independent action, and it is stated that the Burlington and the Wabash have offered half fare excursion rates for G. A. R. gatherings next summer, under circumstances where a fare and one-third has heretofore been maintained.

A despatch of Wednesday states that the Chicago, Milwaukee & St. Paul has announced a reduction of $2.50 in the fare from Kansas City to Chicago.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all lines for the week ending Saturday, Dec. 28, amounted to 102,196 tons, against 111,932 tons during the preceding week, an increase of 264 tons, and against 90,409 tons during the corresponding week of 1888, a decrease of 11,787 tons. The proportions carried by each road were:

	W'k to Dec. 28.		W'k to Dec. 21.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	10,186	9.9	13,821	12.3
Wabash	3,154	3.1	5,662	5.1
Lake Shore & Michigan South.	17,256	16.9	16,801	15.0
Pitts., Ft. Wayne & Chicago	11,350	11.1	13,369	11.9
Chicago, St. Louis & Pitts.	14,688	14.4	10,165	9.1
Baltimore & Ohio	14,111	13.8	19,212	17.2
Chicago & Grand Trunk	14,688	14.4	17,529	15.7
New York, Chic. & St. Louis	8,888	8.7	7,952	7.1
Chicago & Atlantic	7,187	7.7	7,411	6.6
Total	102,196	100.0	111,922	100.0

Of the above shipments 10,369 tons were flour, 59,860 tons grain, 2,631 tons millstuffs, 6,408 tons cured meats, 4,202 tons lard, 7,228 tons dressed beef, 1,246 tons butter, 1,385 tons hides, 270 tons wool and 4,910 tons lumber, The three Vanderbilt lines together carried 35.5 per cent. of all the shipments, while the Pennsylvania lines carried 25.5 per cent.

The decrease from Dec. 21 to 28 is wholly in local shipments, through freight having increased 1,000 tons. The week to Dec. 21 was the heaviest on record, with the exception of the same week last year, which exceeded it by nine tons. For the first time in years the Baltimore & Ohio road headed the list (Dec. 21, 17.2 per cent.). It carried 10,895 tons of corn out of a total of 41,697 tons, all its other shipments for the week aggregating but 8,317 tons.